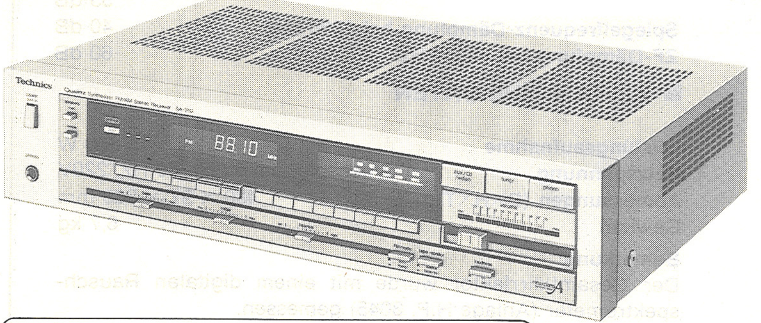
ORDER NO. SD83072611C2

Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

SA-310
[EGA]

SA-310(K)
[EGA]



* The colors of this model included silver and black.
* The black type model is provided with (K) in the Service Manual.

Area

* [EGA] is available in F.R. Germany.

TECHNISCHE DATEN (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

DIN-Ausgangsleistung	2 × 54W (4 Ω) 2 × 42W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 48W (4 Ω) 2 × 37W (8 Ω)
Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz	
beide Kanäle ausgesteuert	2 × 40W (4 Ω) 2 × 35W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 1 kHz	0,02% (4 Ω) 0,02% (8 Ω)
Nennleistung bei 20 Hz ~ 20 kHz	0,04% (4 Ω) 0,02% (8 Ω)
halbe Nennleistung bei 1 kHz	0,005% (8 Ω)
Intermodulationsfaktor	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,04%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,02%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei −3 dB	5 Hz ~ 40 kHz (4 Ω)
Dämpfungsfaktor	20 (4 Ω), 40 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
AUX/CD/VIDEO	150 mV/22 kΩ
Tape	150 mV/22 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	160 mV
Frequenzgang	
Phono	RIAA-Standardkurve ±0,8 dB (30 Hz ~ 15 kHz)
AUX/CD/VIDEO, TAPE	5 Hz ~ 70 kHz (−3 dB)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ −10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ −10 dB
Geräuschabstand	
Nennleistung (4 Ω)	
Phono	75 dB (nach IHF, A: 80 dB)
AUX/CD/VIDEO, TAPE	88 dB (nach IHF, A: 95 dB)
−26 dB Leistung (4 Ω)	
Phono	64 dB
AUX/CD/VIDEO, TAPE	66 dB
50 mW Leistung (4 Ω)	
Phono	62 dB
AUX/CD/VIDEO, TAPE	62 dB
Gehörrichtige Lautstärkekorrektur (Loudness)	
(bei −30 dB Ausgangsleistung)	50 Hz, +9 dB
Ausgangsspannung und -impedanz	
Tape, Aufnahme (TAPE, REC OUT)	150 mV
Kanalabweichung (AUX/CD/VIDEO, TAPE, 250 Hz ~ 6300 Hz)	±1 dB
Übersprechdämpfung (AUX/CD/VIDEO, TAPE 1 kHz)	55 dB
Kopfhörerpegel und -impedanz	430 mV/330 Ω
Lautsprecherimpedanz	
MAIN oder REMOTE	4 Ω ~ 16 Ω
MAIN und REMOTE	8 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
Eingangsempfindlichkeit	
S/R 30 dB	1,3 μV (75 Ω)
S/R 26 dB	1,2 μV (75 Ω)
S/R 20 dB	0,9 μV (75 Ω)
Nutzempfindlichkeit nach IHF	1,5 μV (nach IHF '58)
Gesamtklirrfaktor	
Mono	0,08%
Stereo	0,15%

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Geräuschabstand	
Mono	60 dB (78 dB nach IHF)
Stereo	58 dB (72 dB nach IHF)
Frequenzgang	20 Hz ~ 15 kHz (+1 dB ~ −2 dB)
Trennschärfe bei Störsender	+400 kHz, 75 dB
Einfangverhältnis	1 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	75 dB
ZF-Dämpfung bei 98 MHz	100 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	100 dB
MW-Unterdrückung	55 dB
Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	−60 dB (−65 dB nach IHF)
38 kHz	−70 dB (−75 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,5 dB
Begrenzereinsatz	
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	75 Ω (unsymmetrisch)

■ MW-TUNERTEIL

Wellenbereiche	522 ~ 1611 kHz
Eingangsempfindlichkeit (S/R 20 dB)	20 µV, 300 µV/m
Trennschärfe	55 dB
Spiegelfrequenz-Dämpfung bei 1000 kHz	40 dB
ZF-Dämpfung bei 1000 kHz	60 dB

■ ALLGEMEINE DATEN

Leistungsaufnahme	360 W
Netzspannung	Wechselstrom 50 Hz/60 Hz, 220V
Abmessungen (B×H×T)	430 × 97 × 283 mm
Gewicht	6,7 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

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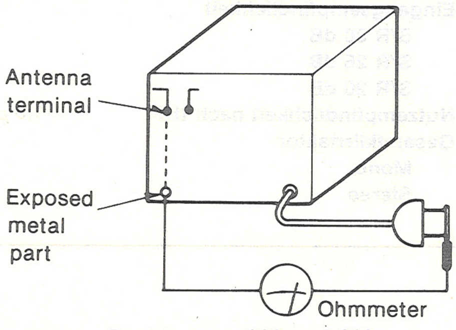
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

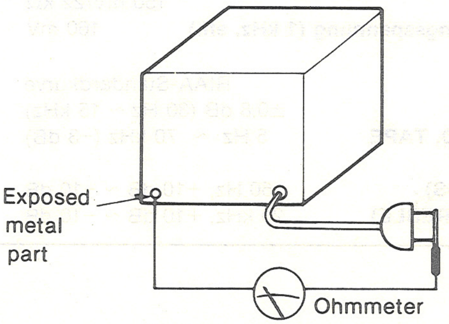
• INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



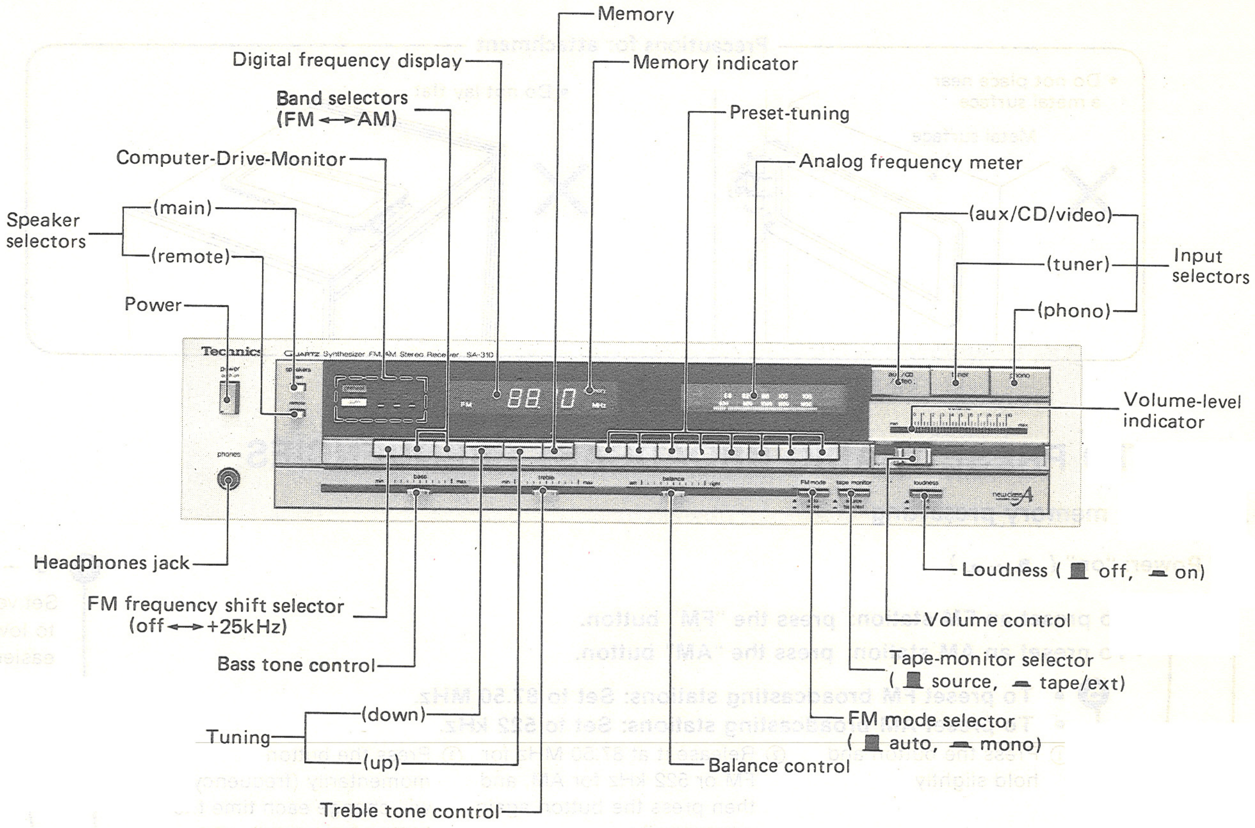
Resistance = 3MΩ—5.2MΩ
(Fig. A)

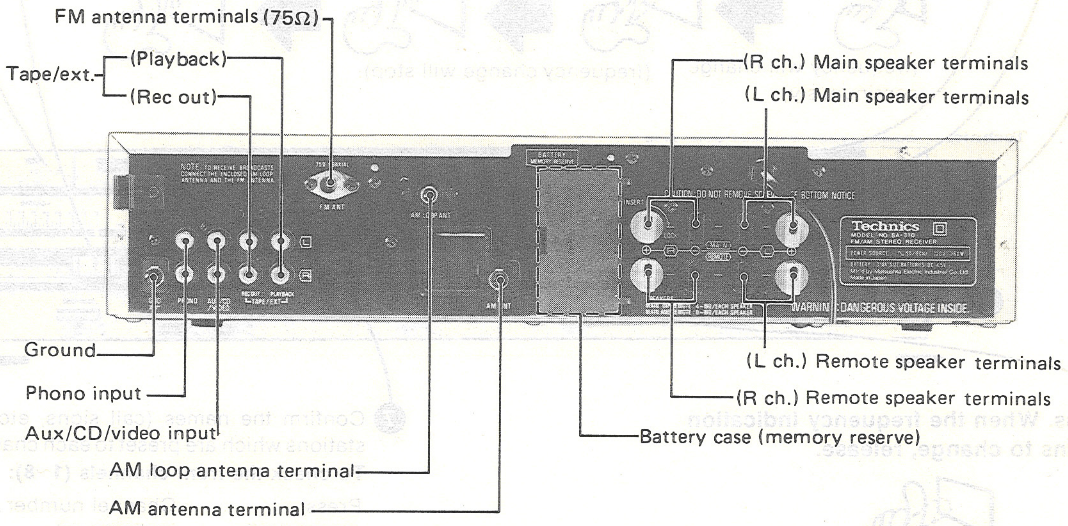


Resistance = Approx ∞
(Fig. B)

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS


Memory
Digital frequency display
Memory indicator
Band selectors (FM ←→ AM)
Preset-tuning
Computer-Drive-Monitor
Analog frequency meter
Speaker selectors
(main)
(remote)
(aux/CD/video)
(tuner)
(phono)
Input selectors
Power
Volume-level indicator
Headphones jack
Loudness (▆ off, ▂ on)
FM frequency shift selector (off ←→ +25kHz)
Volume control
Bass tone control
Tape-monitor selector (▆ source, ▂ tape/ext)
Tuning
(down)
(up)
FM mode selector (▆ auto, ▂ mono)
Balance control
Treble tone control

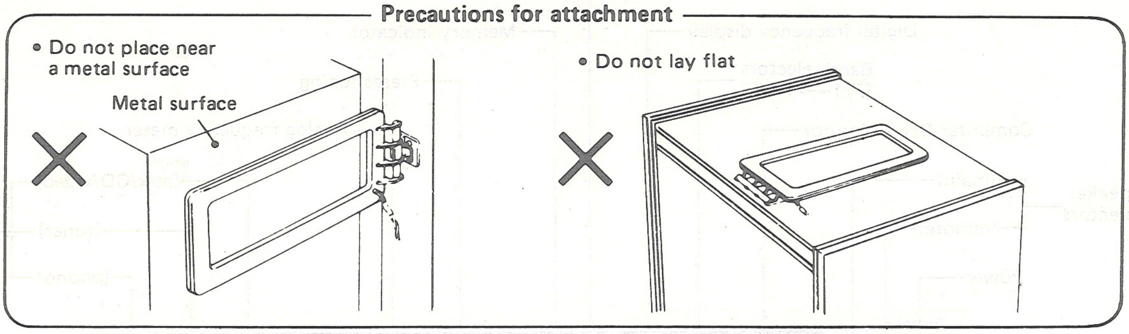

FM antenna terminals (75Ω)
Tape/ext.
(Playback)
(Rec out)
(R ch.) Main speaker terminals
(L ch.) Main speaker terminals
Ground
(L ch.) Remote speaker terminals
Phono input
(R ch.) Remote speaker terminals
Aux/CD/video input
Battery case (memory reserve)
AM loop antenna terminal
AM antenna terminal

- Phono input capacitance is about 150pF.

■ AM LOOP ANTENNA

When the AM loop antenna is connected to the rear panel, place it as far away from the set as possible to improve the sensitivity.

Precautions for attachment


Metal surface

- Do not place near a metal surface
- Do not lay flat

■ HOW TO PRESET RADIO BROADCAST FREQUENCIES

- **Automatic memory presetting**

① **"0 → 1"**
Set volume control to low position for easier tuning.

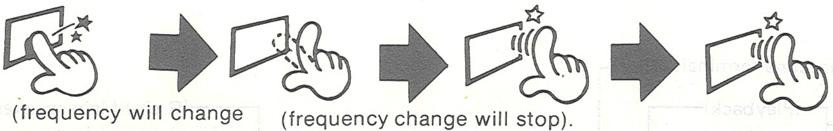
② **"tuner"**

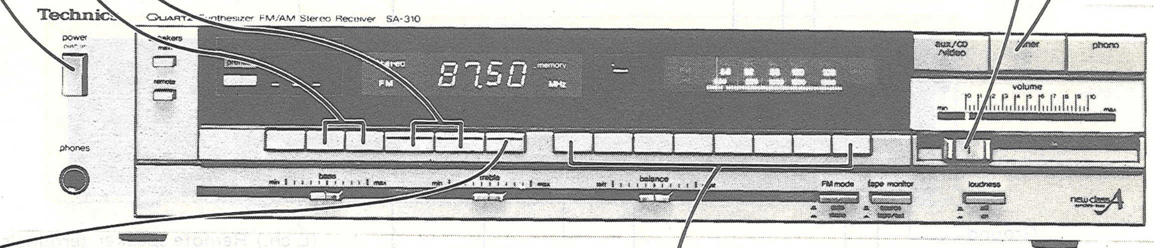
③ **Power: "on" (■ — ■)**

④ **•To preset an FM station: press the "FM" button.**
•To preset an AM station: press the "AM" button.

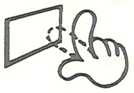
⑤ **• To preset FM broadcasting stations: Set to 87.50 MHz.**
• To preset AM broadcasting stations: Set to 522 kHz.

① Press the button and hold slightly
② Release it at 87.50 MHz for FM or 522 kHz for AM, and then press the button again momentarily
③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.


(frequency will change continuously).
(frequency change will stop).


Technics
Quartz Synthesizer FM/AM Stereo Receiver SA-310
power
speakers
remote
phones
FM
87.50
memory
MHz
aux/CD /video
tuner
phono
volume
min
max
bass
treble
balance
FM mode
tape monitor
loudness
new class A

⑥ **Press. When the frequency indication begins to change, release.**

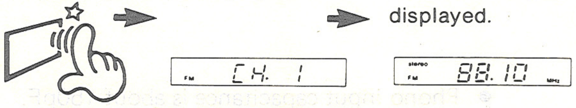


(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

⑦ Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel.

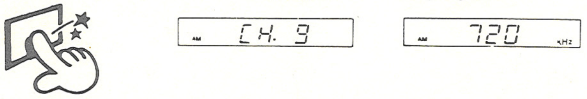
To check the front channels (1~8):

Press momentarily. → Channel number is displayed. → Frequency stored in the memory is displayed.


FM CH. 1
stereo FM 88.10 MHz

To check the back channels (9~16):

Press slightly longer. → Release the button when the channel number is displayed. → Frequency stored in the memory is displayed.


AM CH. 9
AM 720 kHz

Notes:

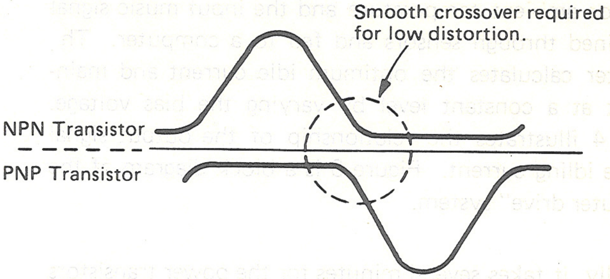
1. In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

TECHNICAL INFORMATION

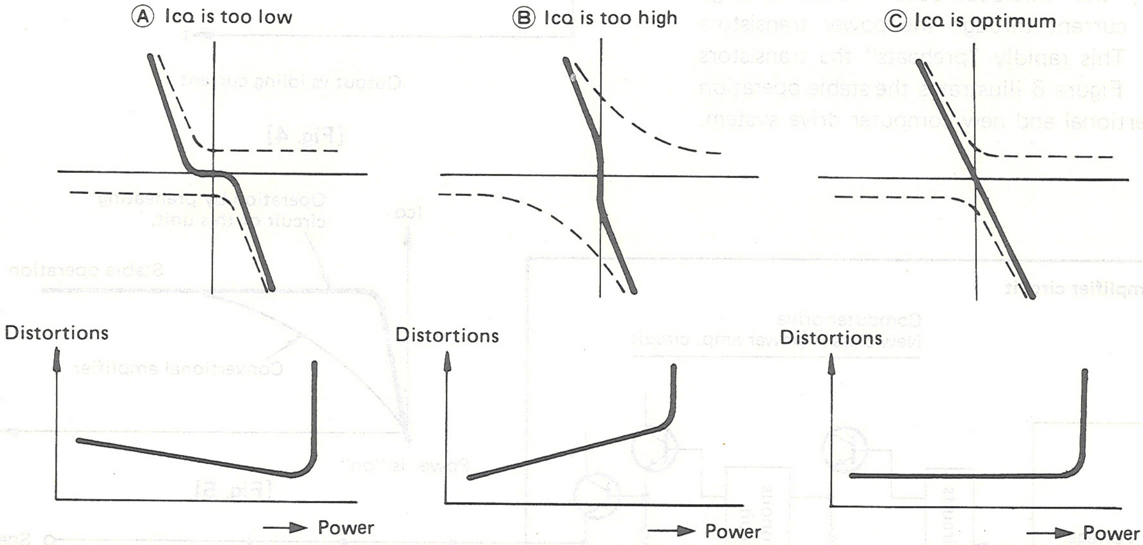
Technics New Class A amplifier circuitry eliminates switching and crossover distortion. To further improve fidelity a "computer drive" circuit has been incorporated to eliminate transient distortion in music signal reproduction.

• Power transistor idling current (Ica)

The idling current through the power transistors is adjusted so that crossover distortion is minimized when switching from the NPN transistor to the PNP transistor in a complimentary design (Fig. 1).
If Ica is not adjusted properly, distortion will result as in Fig. 2.



[Fig. 1]

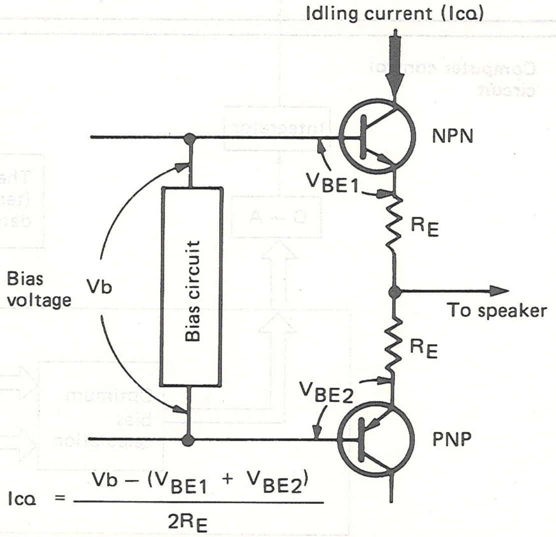


Relationship between idling current level and cross-over distortion.

[Fig. 2]

• Idling current and bias current

Idling current is determined by the bias voltage (Vb) of the bias circuit and the V_{BE} of each power transistor (Fig. 3). The V_{BE} varies according to the temperature of the transistor. This temperature varies instantaneously with the music signal. Unfortunately, with current designs, these instantaneous fluctuations cannot be detected due to the placement of the thermal sensor and the slow temperature change of the heat sink. Attempts have been made to include a thermal sensor as part of the output power pack. However, most power packs do not include a thermal sensor. Also, this method does not work if discrete components are used. We are still faced with the problem of stable bias operation and fast response to abrupt changes in temperature.



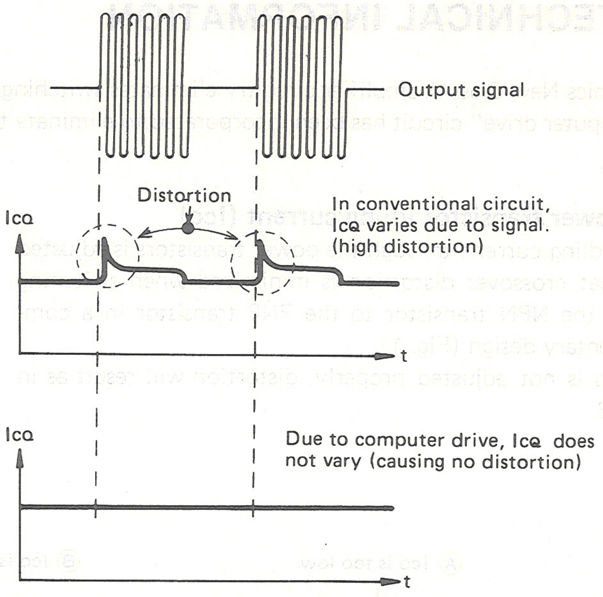
$$I_{ca} = \frac{V_b - (V_{BE1} + V_{BE2})}{2R_E}$$

[Fig. 3]

- **Computer drive system**

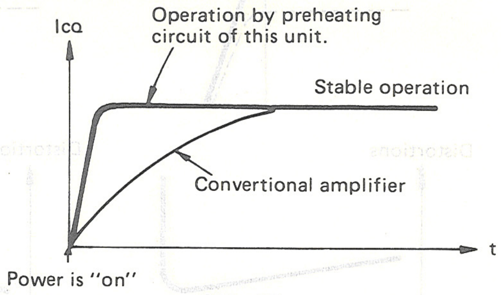
Knowing the thermal and signal characteristics of the power transistors, a system can be designed to calculater the instantaneous temperature changes and adjust for the optimum idling current. Information regarding th transistor ambient temperature and the input music signal is obtained through sensors and fed to a computer. Th computer calculates the optimum idle current and maintains it at a constant level by varying the bias voltage. Figure 4 illustrates the relationship of the output signal and the idling current. Figure 6 is a block diagram of the "computer drive" system.

Generally, it takes several minutes for the power transistors to reach the temperature of stable operation after the power is turned on. To ensure stable and optimum performance quickly, the microcomputer forces a large amount of idling current through the power transistors for a short time. This rapidly "preheats" the transistors and the heat sink. Figure 6 illustrates the stable operation level for the convertional and new computer drive system.

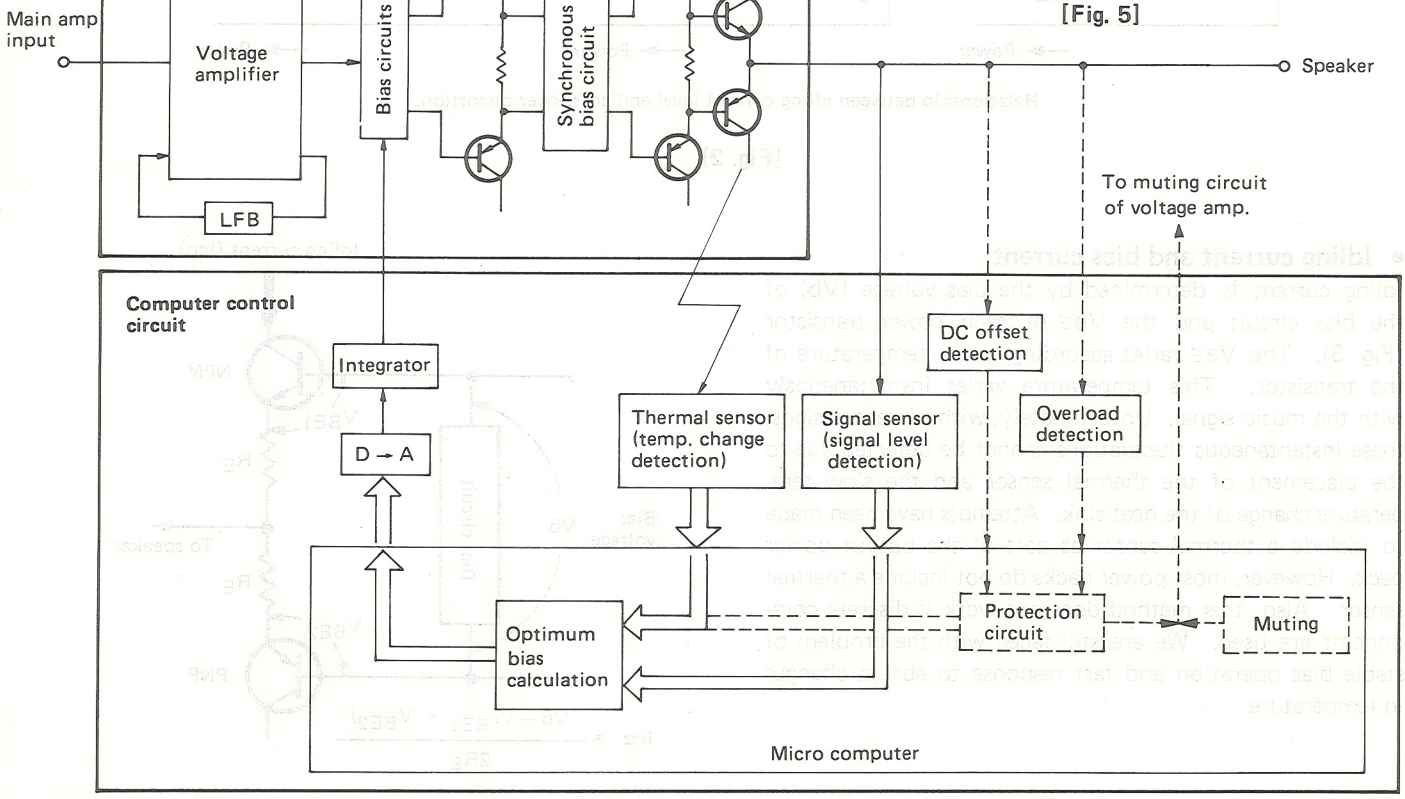


Output vs idling current

[Fig. 4]



[Fig. 5]


Main amplifier circuit
Computer drive
New class A power amp. circuit
Main amp input
Voltage amplifier
LFB
Bias circuits
Synchronous bias circuit
Speaker
To muting circuit of voltage amp.
Computer control circuit
Integrator
D → A
Thermal sensor (temp. change detection)
Signal sensor (signal level detection)
DC offset detection
Overload detection
Optimum bias calculation
Protection circuit
Muting
Micro computer

[Fig. 6]

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

Note

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ BEFORE REPAIR AND ADJUSTMENT

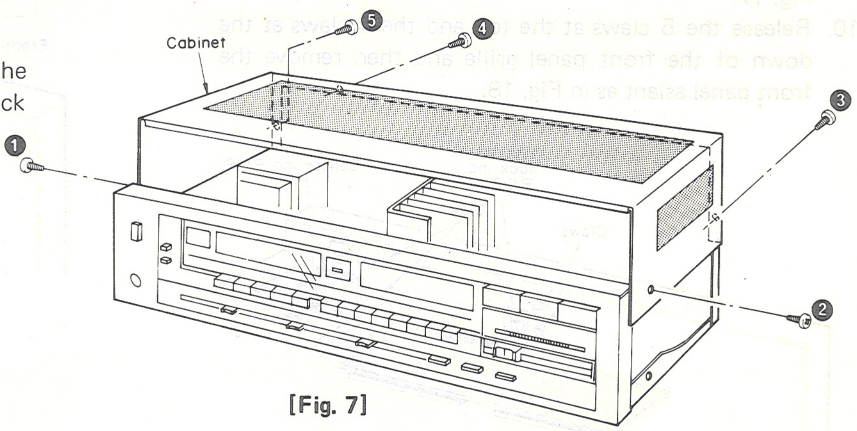
1. Turn off the power supply and short-circuit of power supply capacitors (C703, C704, 6800μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C703 and C704 by screwdriver. It may damage the componet.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnrormality. The consumed current at 60Hz/50Hz in no signal mode is shown below with respect to supply voltage 220V.

Power supply voltage		AC 220V
Consumed current	50 Hz	140 ~ 520mA
	60 Hz	120 ~ 500mA

■ DISASSEMBLY INSTRUCTIONS

● How to remove the cabinet [Fig. 7]

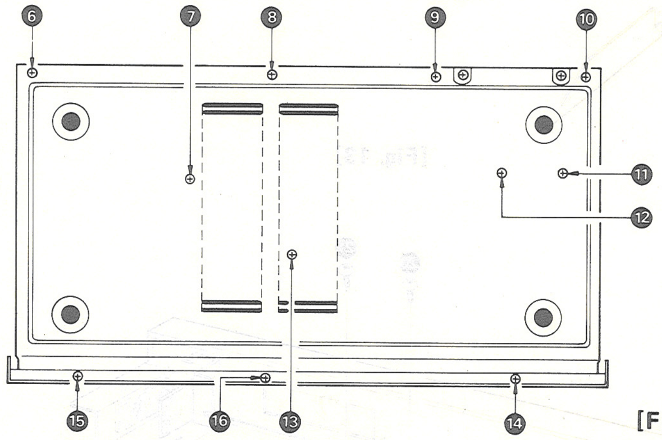
1. Remove the 2 setscrews (Fig. 7 : ①,②) on the side and 3 setscrews (Fig. 7 : ③~⑤) on the back of the cabinet.
2. Remove the cabinet upward.



[Fig. 7]

● How to remove the bottom board [Fig. 8]

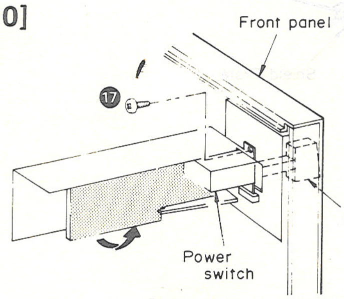
1. Remove the 10 setscrews (Fig. 8 : ⑥ ~ ⑮) of the bottom board.
2. Remove the bottom board.



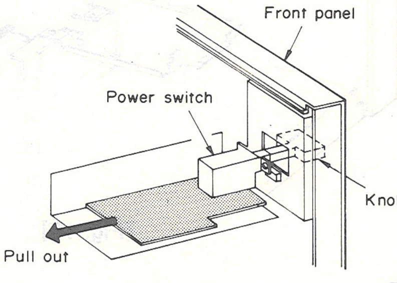
[Fig. 8]

● How to remove the power switch [Fig. 9, 10]

1. Remove the setscrew (Fig. 9 : ⑰) of the power switch.
2. Next, lay down the power switch P.C.B. as shown in Fig. 10, and remove the power switch from the front panel.



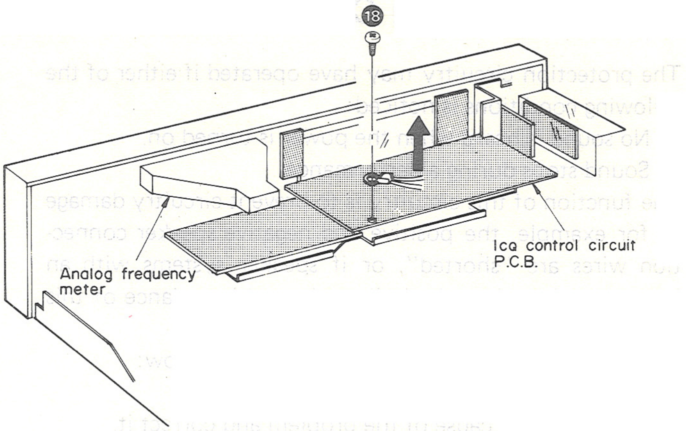
[Fig. 9]



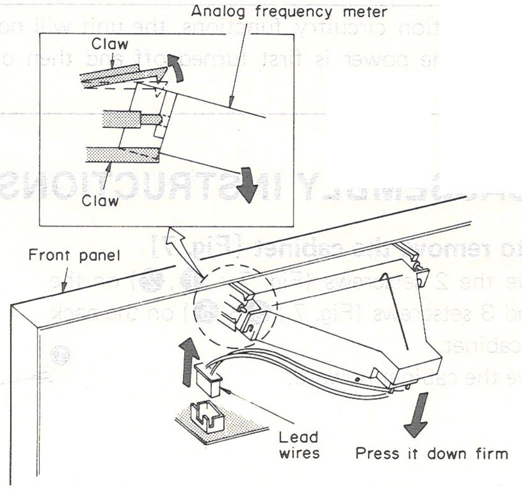
[Fig. 10]

● How to remove the front panel [Fig. 11 ~ 18]

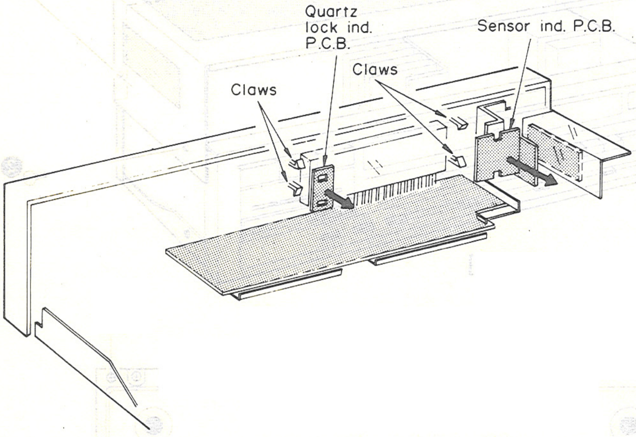
1. Remove the cabinet.
2. Remove the setscrew (Fig. 11 : ⑱), and then remove the Icq control circuit P.C.B.
3. Disconnect the lead wire of analog frequency meter and press down the meter as shown in Fig. 12 to remove it from the front panel assembly.
4. Release the 2 claws which fasten the quartz lock indicator P.C.B. and sensor indicator P.C.B., and then remove the printed circuit board from the front panel. (See Fig. 13)
5. Remove the setscrew (Fig. 14 : ⑲) of the FM/AM preset-tuning P.C.B. and then detach the FM/AM preset-tuning P.C.B.
6. Remove the 2 setscrews (Fig. 15 : ⑳, ㉑) of the shield plate, and then detach the shield plate.
7. Remove the 3 input selector knobs by pushing them from inside the front panel by use of a screwdriver or the like. (Refer to Fig. 16)
8. Remove the 3 setscrews (Fig. 17 : ⑭ ~ ⑯) which secure the front panel from the bottom.
9. Next, pull out the front panel toward you as shown in Fig. 17.
10. Release the 5 claws at the top and the 4 claws at the down of the front panel grille and then remove the front panel aslant as in Fig. 18.


⑱
Analog frequency meter
Icq control circuit P.C.B.

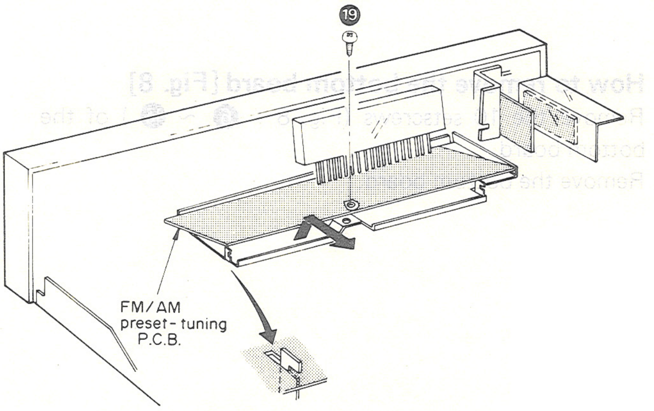
[Fig. 11]


Analog frequency meter
Claw
Claw
Front panel
Lead wires
Press it down firm

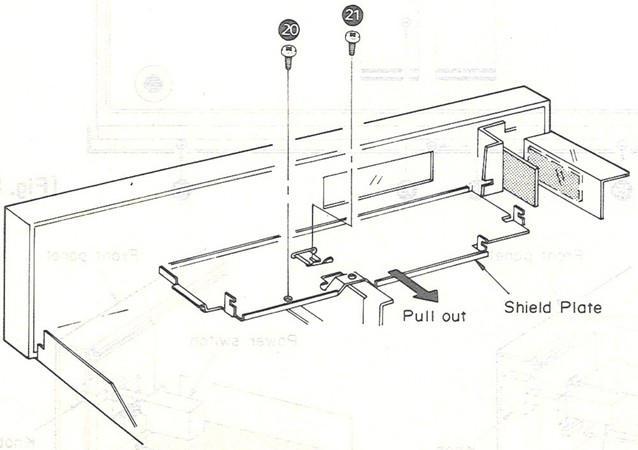
[Fig. 12]


Quartz lock ind. P.C.B.
Sensor ind. P.C.B.
Claws
Claws

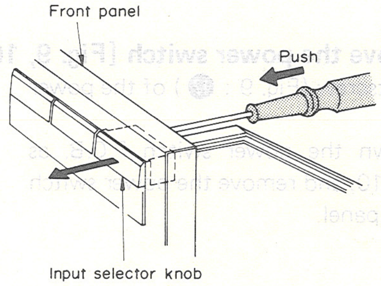
[Fig. 13]


⑲
FM/AM preset-tuning P.C.B.

[Fig. 14]


⑳
㉑
Pull out
Shield Plate

[Fig. 15]


Front panel
Push
Input selector knob

[Fig. 16]

■ OPERATION OF Icq CONTROLLER

• Icq control circuit

a) Preheat

When the power is turned on pin **23** (DO_0) of IC701 goes low. Q721 turns on, illuminating the preheat LED (D717). Q704 also turns on. Q715 (Q716) conducts heavily and increases the Icq through Q601 (Q602) to pin **14** (9) of IC601. For approximately 15 seconds the the Icq should be 2 times higher than normal.

b) Signal sensor

Q708 is set to turn on when the output from pin **21** (2) of IC601 exceeds 2V. At that time pin **11** (BI_3) of IC701 goes low and pin **2** (CO_9) goes high. The "low" LED turns off. The collector current of Q715 (Q716) reduces and decreases the bias current. Q709 turns on when the output exceeds 4V. Pin **12** (BI_2) goes low and pin **3** (CO_8) goes high. The "high" LED turns off and the current through Q715 (Q716) is further decreased.

c) Thermal sensor

When the thermistor (PS701) temperature reaches 60°C, Q711 turns on. Pin **10** (AI_0) of IC701 goes low and pin **4** (CO_7) goes high. This causes a decrease in the collector current of Q715 (Q716) and the thermal LED (D720) turns off.

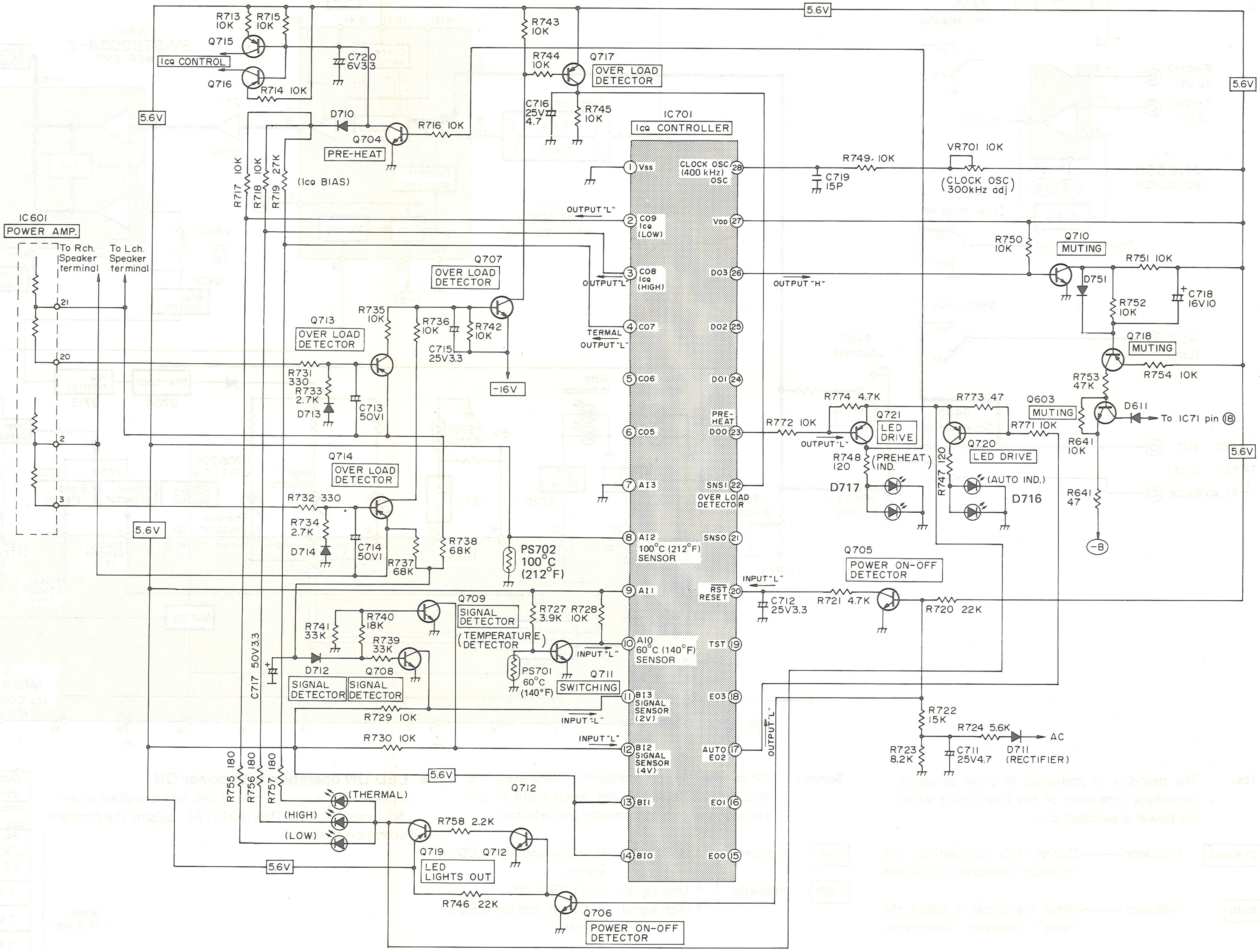
The combination of the signal and thermal sensors serve to change the total impedance of R717 ~ R719 (Bias) to determine the level of Icq applied.

• Muting circuit

When the power is turned on, pin **26** (DO_3) of IC701 goes high for about 4 secones, Q710, Q718 and Q603 turn on to activate IC71 (voltage amplifier).

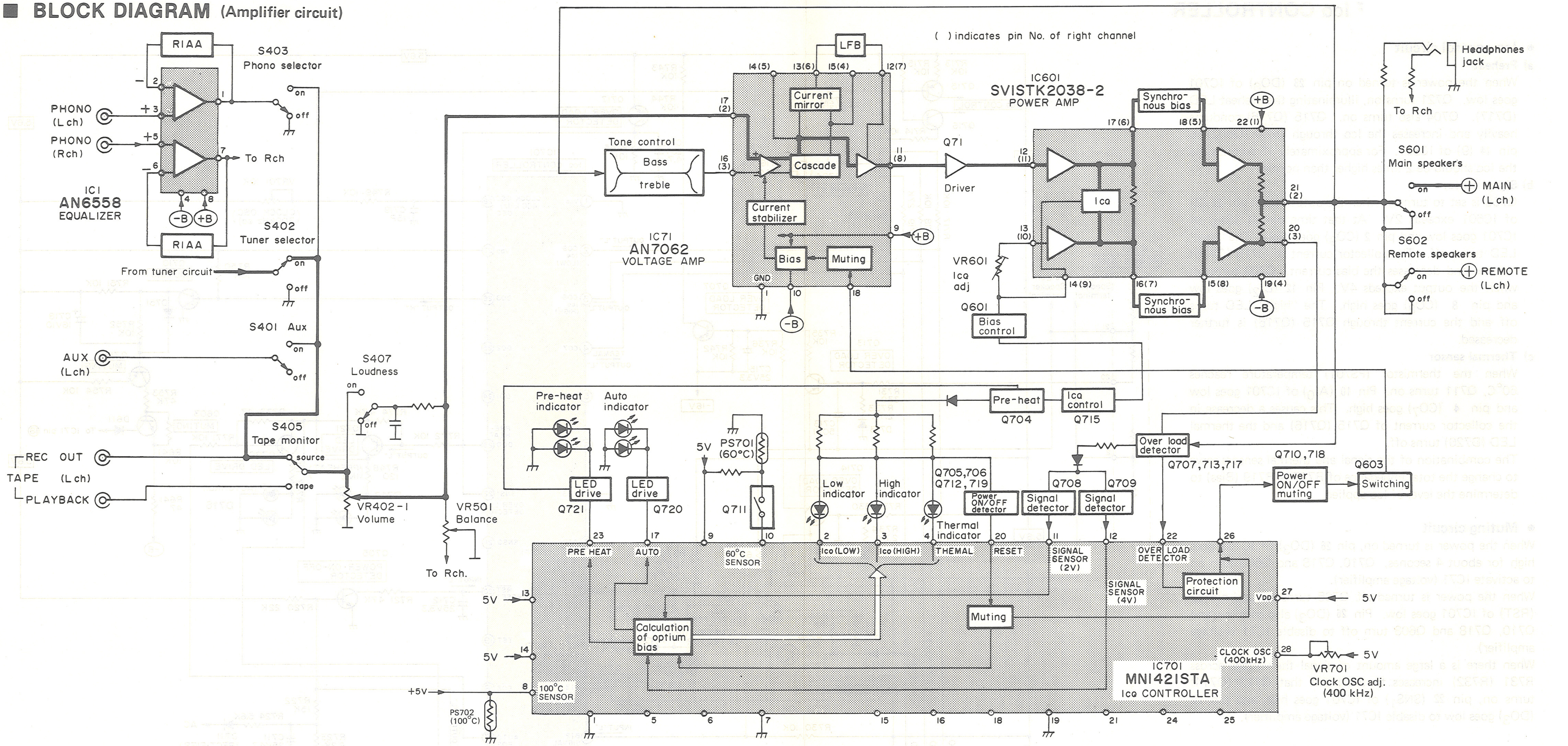
When the power is turned off, Q705 turns on and pin **20** (RST) of IC701 goes low. Pin **26** (DO_3) also goes low and Q710, Q718 and Q603 turn off to disable IC71 (voltage amplifier).

When there is a large amount of signal the voltage across R731 (R732) increases to the point that Q713 (Q714) turns on, pin **22** (SNS_1) of IC701 goes high and pin **26** (DO_3) goes low to disable IC71 (voltage amplifier).



IC701
Icq CONTROLLER
IC601
POWER AMP.
To Rch. Speaker terminal
To Lch. Speaker terminal
5.6V
-16V
-B
R713 10K
R715 10K
Q715
Icq CONTROL
Q716
R714 10K
C720 6V33
D710
Q704
PRE-HEAT
R716 10K
R743 10K
R744 10K
Q717
OVER LOAD DETECTOR
C716 25V 4.7
R745 10K
R717 10K
R718 10K
R719 27K
(Icq BIAS)
Q707
OVER LOAD DETECTOR
Q713
OVER LOAD DETECTOR
R735 10K
R736 10K
R742 10K
C715 25V3.3
R731 330
R733 2.7K
D713
C713 50V1
Q714
OVER LOAD DETECTOR
R732 330
R734 2.7K
D714
C714 50V1
R737 68K
R738 68K
PS702 100°C (212°F)
Q709
SIGNAL DETECTOR
R740 18K
R741 33K
R739 33K
Q708
D712
SIGNAL DETECTOR
SIGNAL DETECTOR
C717 50V3.3
R727 3.9K
R728 10K
(TEMPERATURE DETECTOR)
PS701 60°C (140°F)
Q711
SWITCHING
R729 10K
R730 10K
R755 180
R756 180
R757 180
(THERMAL)
(HIGH)
(LOW)
Q712
R758 2.2K
Q719
LED LIGHTS OUT
R746 22K
Q706
POWER ON-OFF DETECTOR
OUTPUT "L"
TERMAL OUTPUT "L"
INPUT "L"
OUTPUT "H"
① Vss
② CO9 Icq (LOW)
③ CO8 Icq (HIGH)
④ CO7
⑤ CO6
⑥ CO5
⑦ AI3
⑧ AI2 100°C (212°F) SENSOR
⑨ AI1
⑩ AI0 60°C (140°F) SENSOR
⑪ BI3 SIGNAL SENSOR (2V)
⑫ BI2 SIGNAL SENSOR (4V)
⑬ BI1
⑭ BI0
㉘ CLOCK OSC (400 kHz) OSC
㉗ VDD
㉖ DO3
㉕ DO2
㉔ DO1
㉓ PRE-HEAT DO0
㉒ SNS1 OVER LOAD DETECTOR
㉑ SNS0
⑳ RST RESET
⑲ TST
⑱ EO3
⑰ AUTO EO2
⑯ EO1
⑮ EO0
R749 10K
C719 15P
VR701 10K
(CLOCK OSC 300kHz adj)
R750 10K
Q710
MUTING
D751
R751 10K
C718 16V10
R752 10K
Q718
MUTING
R753 47K
R754 10K
R774 4.7K
R772 10K
Q721
LED DRIVE
R748 120
(PREHEAT IND.)
D717
R773 47
Q603
MUTING
R771 10K
Q720
LED DRIVE
R747 120
(AUTO IND.)
D716
R641 10K
R641 47
D611
To IC71 pin ⑱
Q705
POWER ON-OFF DETECTOR
C712 25V3.3
R721 4.7K
R720 22K
R722 15K
R724 5.6K
D711
AC
R723 8.2K
C711 25V4.7
(RECTIFIER)

BLOCK DIAGRAM (Amplifier circuit)


( ) indicates pin No. of right channel
RIAA
S403
Phono selector
on
off
PHONO (Lch)
PHONO (Rch)
To Rch
IC1
AN6558
EQUALIZER
-B
+B
RIAA
S402
Tuner selector
From tuner circuit
S401 Aux
AUX (Lch)
S407
Loudness
S405
Tape monitor
source
tape
TAPE
REC OUT
PLAYBACK
(Lch)
VR402-1
Volume
VR501
Balance
To Rch.
Tone control
Bass
treble
IC71
AN7062
VOLTAGE AMP
LFB
Current mirror
Cascade
Current stabilizer
Bias
Muting
GND
Q71
Driver
IC601
SVISTK2038-2
POWER AMP
Synchro-nous bias
Ica
VR601
Ica adj
Q601
Bias control
Headphones jack
To Rch
S601
Main speakers
MAIN (Lch)
S602
Remote speakers
REMOTE (Lch)
Pre-heat indicator
Auto indicator
LED drive
Q721
LED drive
Q720
5V
PS701 (60°C)
Q711
Low indicator
High indicator
Q705,706
Q712,719
Thermal indicator
Pre-heat
Q704
Ica control
Q715
Power ON/OFF detector
Signal detector
Q708
Signal detector
Q709
Over load detector
Q707,713,717
Power ON/OFF muting
Q710,718
Switching
Q603
PRE HEAT
AUTO
60°C SENSOR
Ica (LOW)
Ica (HIGH)
THEMAL
RESET
SIGNAL SENSOR (2V)
SIGNAL SENSOR (4V)
OVER LOAD DETECTOR
Protection circuit
VDD
Calculation of optium bias
Muting
CLOCK OSC (400kHz)
VR701
Clock OSC adj.
(400 kHz)
IC701
MN1421STA
Ica CONTROLLER
100°C SENSOR
+5V
PS702 (100°C)

Ica: The heat-sink is preheated in order to assure immediate operation of the bias circuit when the power is switched on.

preheat indicator —— During this preheating, the "preheat" indicator illuminates.

auto indicator —— When the circuit is stable, the "auto" indicator illuminates.

Sensor: When the "auto" indicator illuminates, the music signal level and the temperature of the radiator and output transistor are detected.

low indicator
high indicator

- * No signal: both low and high LED's are on.
- * Low signal: low LED is off.
- * High signal: both high and low LED's are off.

thermal indicator — Temperature of the radiator exceeds 60°C, thermal LED turns off.

- **LED ON operation with power ON**

(When power supply is turned ON, Vcc is applied to pin ⑳ (reset) of IC701 (MN1421STA), causing the program operation to start.

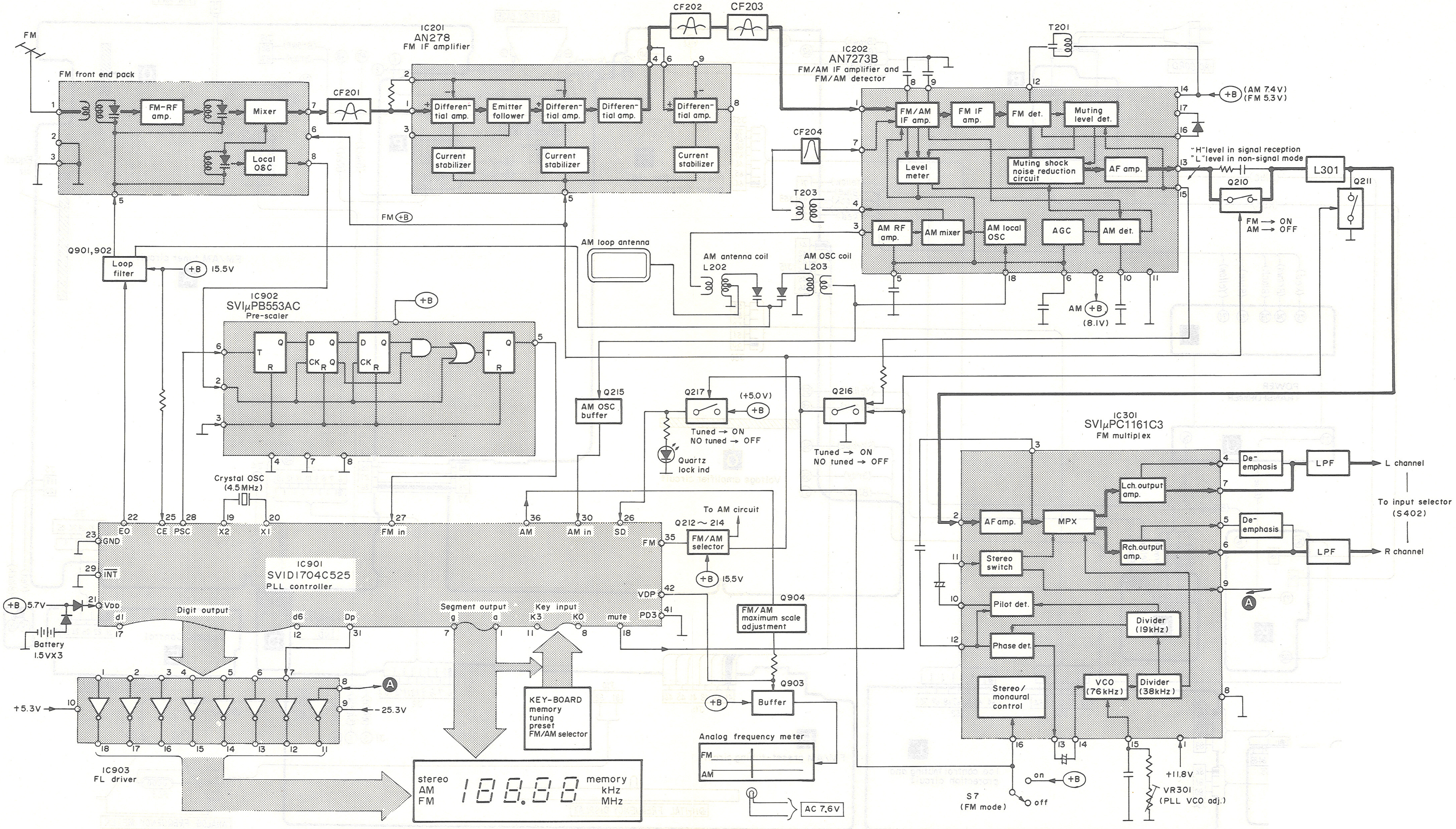
Output port indicator sec.	⑰ pin EO2 Ica auto	㉓ pin DO0 Ica preheat	③ pin CO8 bias low	② pin CO9 bias high	④ pin CO7 sensor thermal	㉖ pin DO3 Muting
Power "ON"	▨ Ⓛ	▨ Ⓛ	▨ Ⓛ	▨ Ⓛ	▨ Ⓛ	Muting ON Ⓛ ↓
0.5 sec.	▨	▨	▨	▨	▨	
1 sec.	Ⓗ	▨	▨	Ⓗ	Ⓗ	
1 sec.		▨	Ⓗ	▨		
1 sec.		▨		Ⓗ	▨ Ⓛ	
1 sec.		▨	▨ Ⓛ		Ⓗ	Muting off Ⓗ ↓
10 sec.		▨	▨			
↓	▨ Ⓛ	Ⓗ	LED turns ON/OFF according to the signal level or temperature alteration.			

about 14.5 sec.

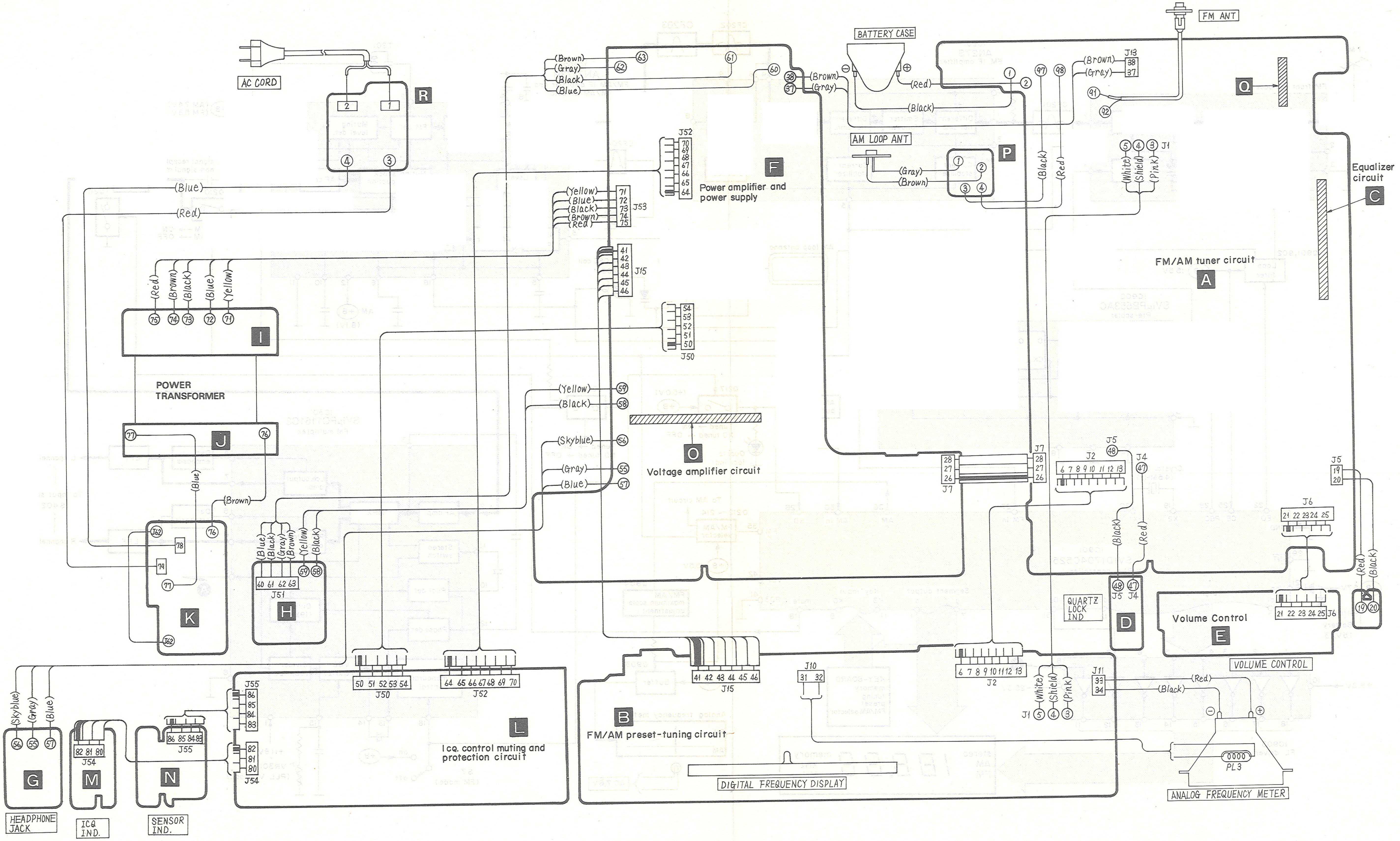
This operation is programed

▨ "ON" (light up) time

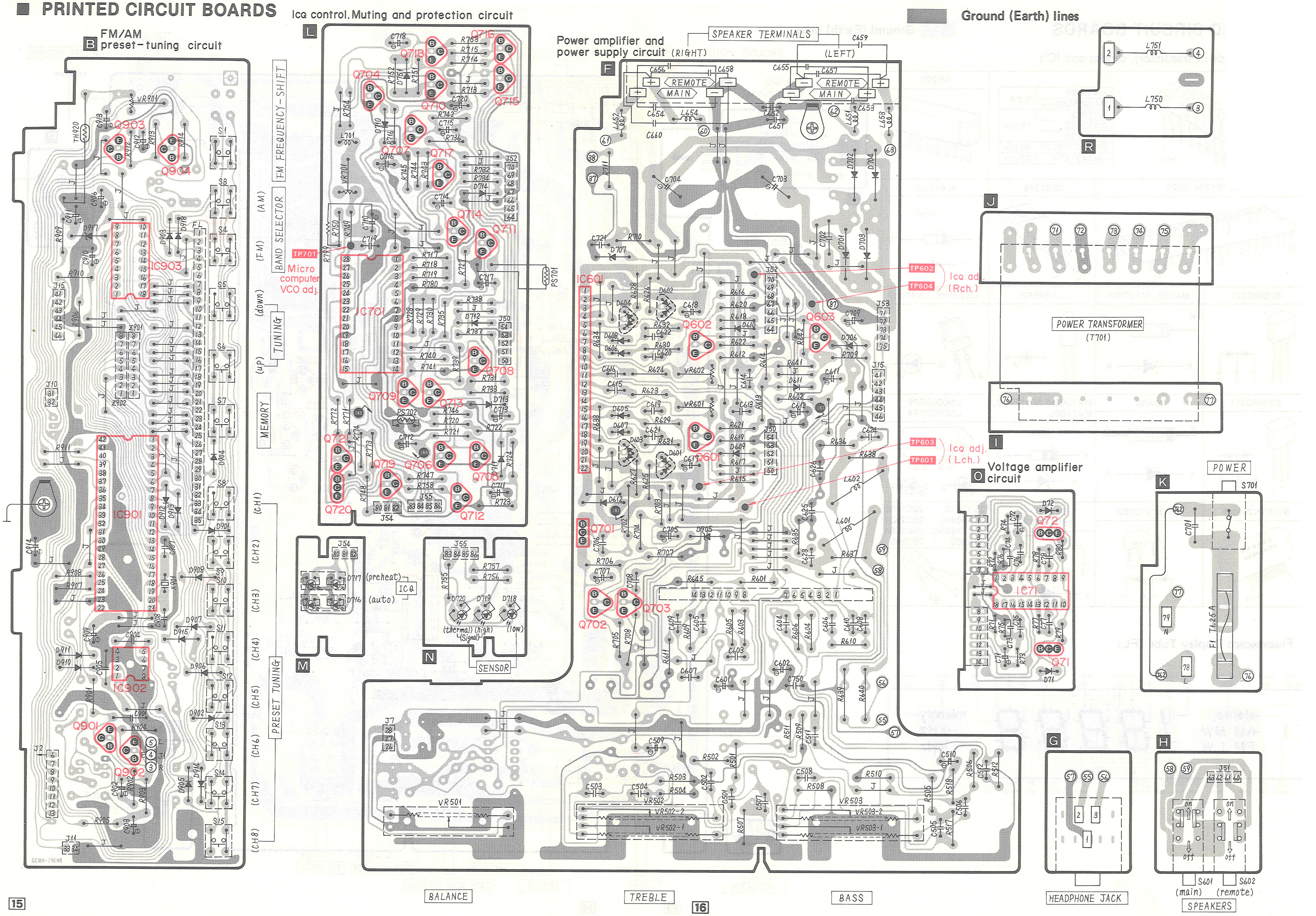
■ BLOCK DIAGRAM (Tuner Circuit)


FM
FM front end pack
FM-RF amp.
Mixer
Local OSC
CF201
IC201
AN278
FM IF amplifier
Differen-tial amp.
Emitter follower
Differen-tial amp.
Differen-tial amp.
Differen-tial amp.
Current stabilizer
Current stabilizer
Current stabilizer
CF202
CF203
IC202
AN7273B
FM/AM IF amplifier and FM/AM detector
FM/AM IF amp.
FM IF amp.
FM det.
Muting level det.
Level meter
Muting shock noise reduction circuit
AF amp.
AM RF amp.
AM mixer
AM local OSC
AGC
AM det.
CF204
T203
T201
+B (AM 7.4V) (FM 5.3V)
"H" level in signal reception
"L" level in non-signal mode
Q210
L301
Q211
FM → ON
AM → OFF
FM +B
AM loop antenna
AM antenna coil L202
AM OSC coil L203
AM +B (8.1V)
Q901,902
Loop filter
+B 15.5V
IC902
SVIμPB553AC
Pre-scaler
+B
Q215
AM OSC buffer
Q217
(+5.0V)
+B
Tuned → ON
NO tuned → OFF
Quartz lock ind
Q216
Tuned → ON
NO tuned → OFF
IC301
SVIμPC1161C3
FM multiplex
AF amp.
MPX
Lch.output amp.
Rch.output amp.
De-emphasis
De-emphasis
LPF
LPF
L channel
R channel
To input selector (S402)
Stereo switch
Pilot det.
Divider (19kHz)
Phase det.
Stereo/monaural control
VCO (76kHz)
Divider (38kHz)
A
+11.8V
VR301 (PLL VCO adj.)
S7 (FM mode)
on
off
+B
Crystal OSC (4.5MHz)
IC901
SVID1704C525
PLL controller
EO
CE
PSC
X2
X1
FM in
AM
AM in
SD
FM
VDP
PD3
GND
INT
VDD
d1
d6
Dp
g
a
K3
K0
mute
Digit output
Segment output
Key input
To AM circuit
Q212～214
FM/AM selector
+B 15.5V
Q904
FM/AM maximum scale adjustment
Q903
+B
Buffer
Analog frequency meter
FM
AM
AC 7.6V
+B 5.7V
Battery 1.5V×3
+5.3V
-25.3V
A
IC903
FL driver
KEY-BOARD
memory
tuning
preset
FM/AM selector
stereo
AM
FM
188.88
memory
kHz
MHz

■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)


AC CORD
R
FM ANT
BATTERY CASE
AM LOOP ANT
P
Q
Equalizer circuit
C
F
Power amplifier and power supply
J52
J53
J15
J50
FM/AM tuner circuit
A
I
POWER TRANSFORMER
J
O
Voltage amplifier circuit
J7
J2
J5
J4
J6
J1
J13
K
H
J51
QUARTZ LOCK IND
D
Volume Control
E
VOLUME CONTROL
G
HEADPHONE JACK
M
ICQ IND.
J54
N
SENSOR IND.
J55
L
Icq. control muting and protection circuit
B
FM/AM preset-tuning circuit
J10
J11
DIGITAL FREQUENCY DISPLAY
PL3
ANALOG FREQUENCY METER
(Brown)
(Gray)
(Black)
(Blue)
(Red)
(Yellow)
(Skyblue)
(White)
(Shield)
(Pink)

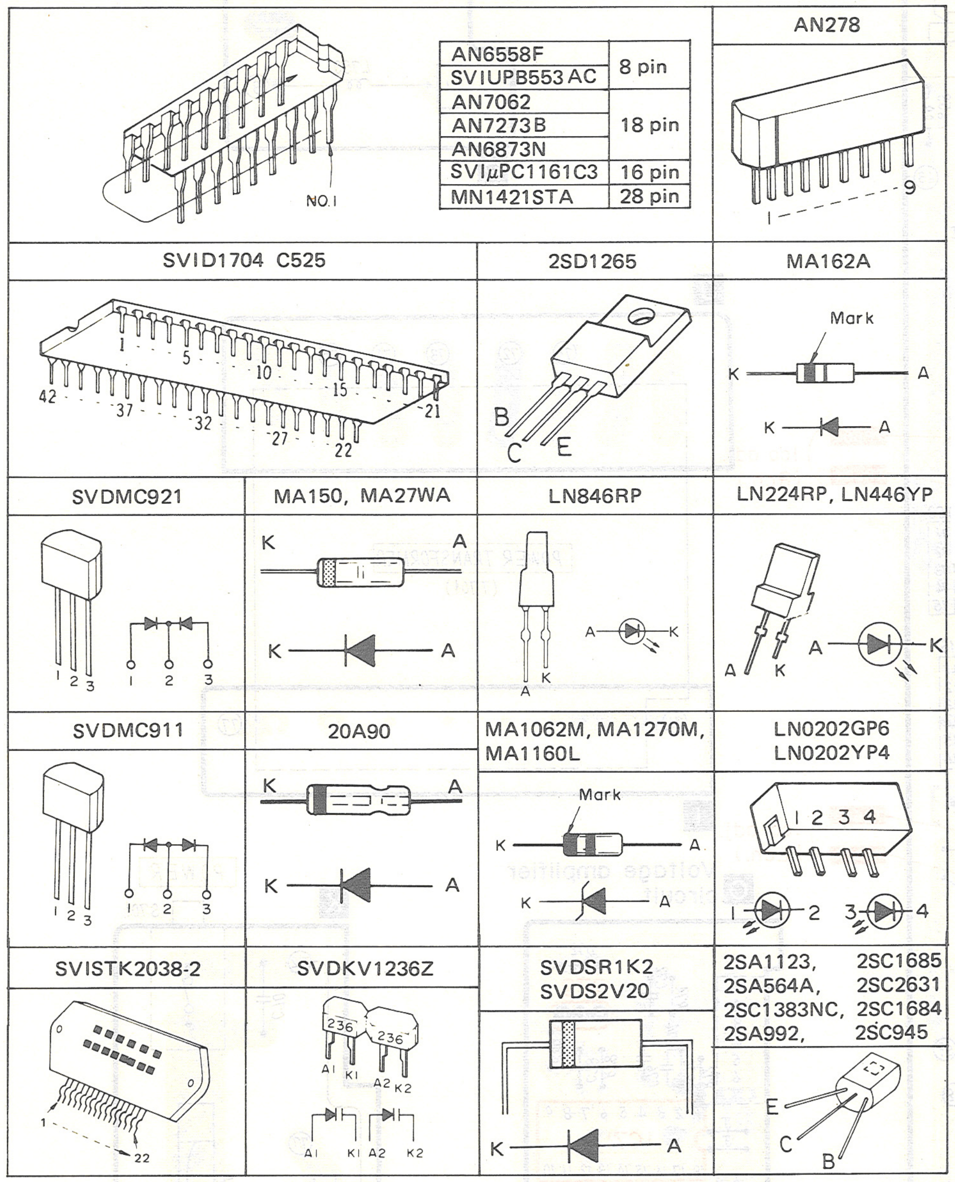
■ PRINTED CIRCUIT BOARDS


Ground (Earth) lines
B FM/AM preset-tuning circuit
L Icq control. Muting and protection circuit
F Power amplifier and power supply circuit
SPEAKER TERMINALS
(RIGHT)
(LEFT)
REMOTE
MAIN
R
J
POWER TRANSFORMER (T701)
I
O Voltage amplifier circuit
K
POWER
S701
F1 T1.25A
M
N
G
H
FM FREQUENCY-SHIFT
BAND SELECTOR (FM) (AM)
TUNING (down) (up)
MEMORY
PRESET TUNING (CH1) (CH2) (CH3) (CH4) (CH5) (CH6) (CH7) (CH8)
TP701 Micro computer VCO adj.
TP602 TP604 Icq adj. (Rch.)
TP603 TP601 Icq adj. (Lch.)
IC901
IC902
IC903
IC701
IC601
IC71
Q901
Q902
Q903
Q904
Q701
Q702
Q703
Q704
Q705
Q706
Q707
Q708
Q709
Q710
Q711
Q712
Q713
Q714
Q715
Q716
Q717
Q718
Q719
Q720
Q721
Q601
Q602
Q603
Q71
Q72
D717 (preheat)
D716 (auto)
ICQ
D720 D719 D718
(thermal) (high) (low)
(signal)
SENSOR
VR501
VR502
VR503
BALANCE
TREBLE
BASS
HEADPHONE JACK
S601 (main)
S602 (remote)
SPEAKERS
on
off

PRINTED CIRCUIT BOARDS

▨ Ground (Earth) lines

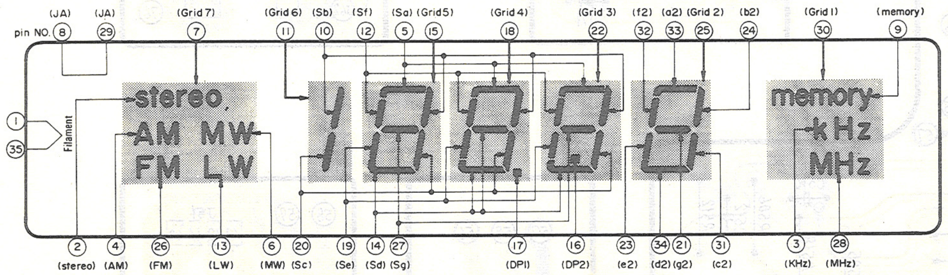
- Terminal guide of transistors, diodes and IC's



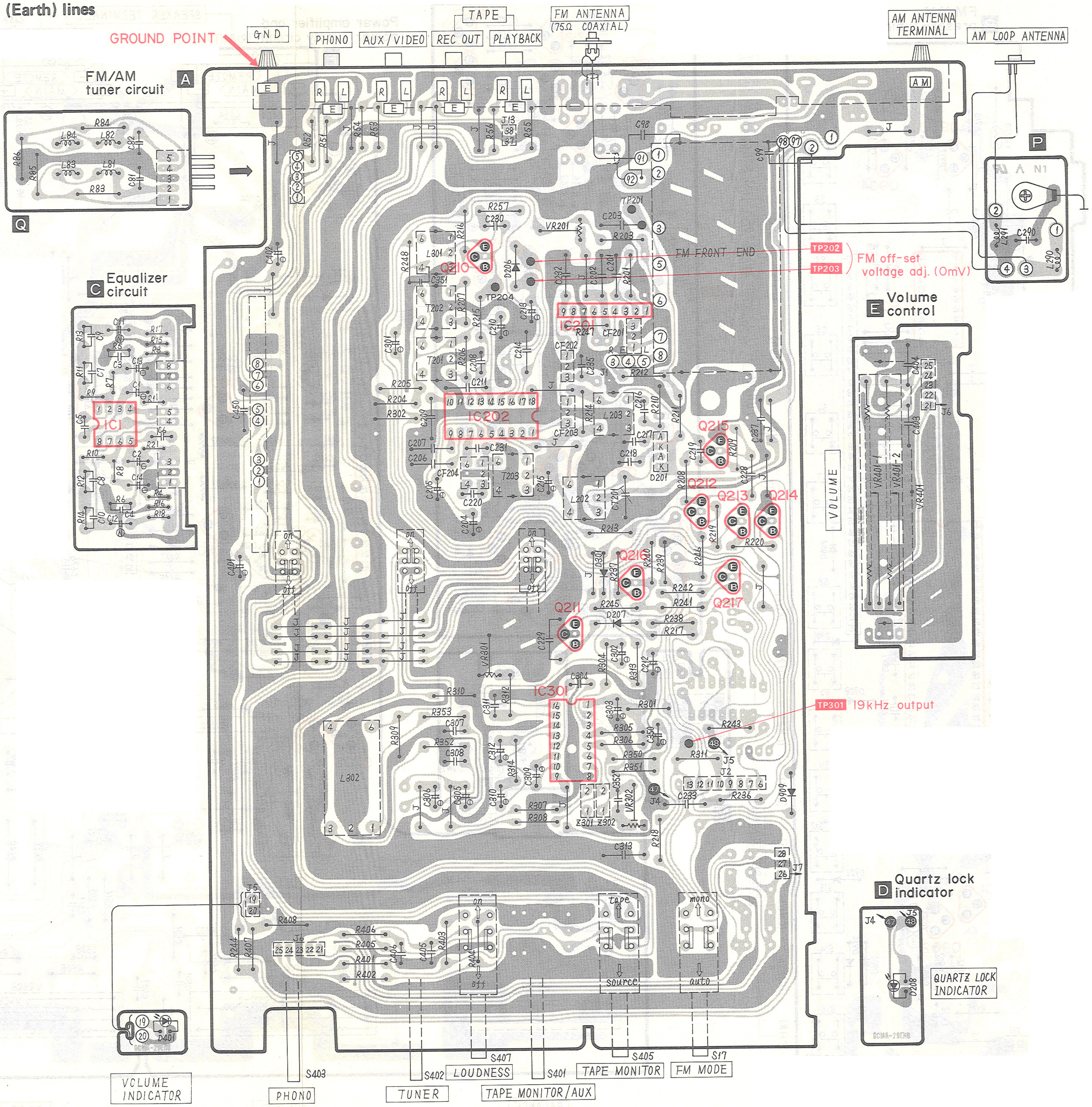
AN6558F SVIUPB553AC	8 pin
AN7062 AN7273B AN6873N	18 pin
SVIμPC1161C3	16 pin
MN1421STA	28 pin

NO.1
AN278
1
9
SVID1704 C525
1
5
10
15
42
37
32
27
22
21
2SD1265
B
C
E
MA162A
Mark
K
A
SVDMC921
1 2 3
MA150, MA27WA
K
A
LN846RP
A
K
LN224RP, LN446YP
SVDMC911
20A90
MA1062M, MA1270M, MA1160L
LN0202GP6
LN0202YP4
1 2 3 4
2
3
4
SVISTK2038-2
1
22
SVDKV1236Z
236
A1
K1
A2
K2
SVDSR1K2
SVDS2V20
2SA1123, 2SA564A, 2SC1383NC, 2SA992, 2SC1685, 2SC2631, 2SC1684, 2SC945
E
C
B

- Fluorescent Display Tube (FL)



pin NO.
(JA)
(JA)
(Grid 7)
(Grid 6)
(Sb)
(Sf)
(Sa)
(Grid 5)
(Grid 4)
(Grid 3)
(f2)
(a2)
(Grid 2)
(b2)
(Grid 1)
(memory)
8
29
7
11
10
12
5
15
18
22
32
33
25
24
30
9
1
35
Filament
stereo
AM MW
FM LW
memory
kHz
MHz
2
4
26
13
6
20
19
14
27
17
16
23
34
21
31
3
28
(stereo)
(AM)
(FM)
(LW)
(MW)
(Sc)
(Se)
(Sd)
(Sg)
(DP1)
(DP2)
(e2)
(d2)
(g2)
(c2)
(KHz)
(MHz)

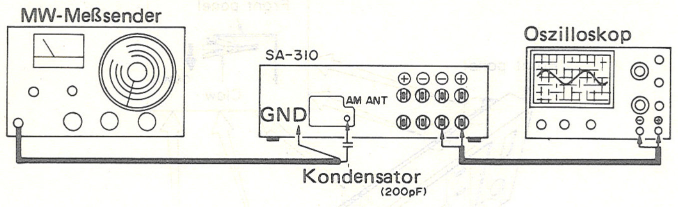


GROUND POINT
GND
PHONO
AUX/VIDEO
TAPE
REC OUT
PLAYBACK
FM ANTENNA (75Ω COAXIAL)
AM ANTENNA TERMINAL
AM LOOP ANTENNA
FM/AM tuner circuit
A
Q
C
Equalizer circuit
IC1
P
E
Volume control
VOLUME
D
Quartz lock indicator
QUARTZ LOCK INDICATOR
FM FRONT END
TP202
TP203
FM off-set voltage adj. (0mV)
TP301
19kHz output
IC201
IC202
IC301
Q210
Q211
Q212
Q213
Q214
Q215
Q216
Q217
VR201
VR301
VR302
VR401
TP201
TP204
VOLUME INDICATOR
PHONO
TUNER
LOUDNESS
TAPE MONITOR/AUX
TAPE MONITOR
FM MODE
S401
S402
S403
S405
S407
S17
source
auto
mono
tape
on
off
D401
D208

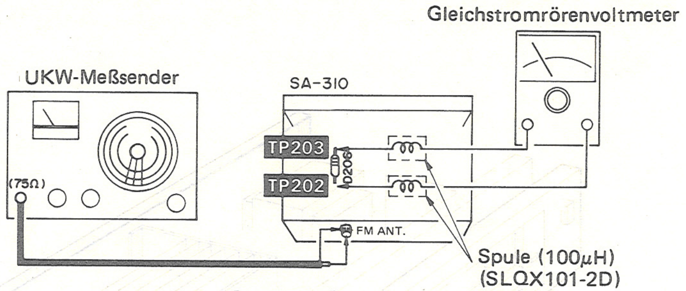
FM (UKW)-EINSTELLUNG

● Stellungen und zu benutzenden Geräte 1. UKW-Meßsender (FM-SG) 2. Verzerrungsmesser 3. Elektronische Voltmeter für Wechsel-und Gleichstrom (VTVM) 4. Signalfrequenzmesser (meßar für 19kHz und 108MHz) 5. Bereichsschalter . . . . . FM 6. Den UKW-Betriebsartenschalter auf die ''mono''-position stellen. 7. Die anderen Einstellungen sind gleich wie beider MW-Justierung. 8. Stereo-Modular (oder Trennmesser)	*** Vorbereitung des UKW-Meßoszillators (UKW-MO)** 1. Stereo-Modulator an FM-SG anschließen. 2. SG Ansgang über 75-Ohm UKW Künstliche Antenne an den Antenneneingang des Gerätes schließen. 3. Die Normal-Eingangs eistung dieses Gerätes beträgt 60dB (1mV), 400Hz, 100% Modulation. (Wegen der Dämpfung bei Verwendung von Koaxialkabeln, muß die MO-Ausgangsleistung 6dB oder mehr (IHF) betragen; d. h. wenn die Eingangsleistung 60dB beträgt, muß der MO-Ausgang 66dB betragen.)

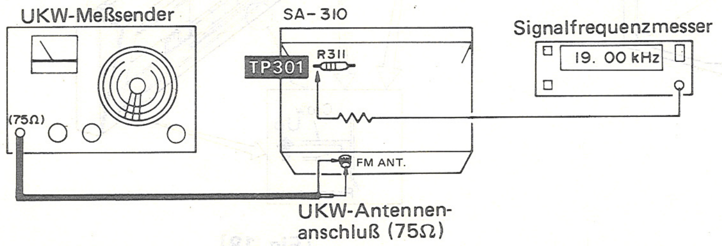
Nr.	FM (UKW) MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHSVERFAHREN
	ANSCHLUSS	FREQUENZ				
	ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO					
3	UKW-MO an den UKW-Antennenanschluß entsprechend Abb. 26. (60dB an den Antennenanschluß legen.)	100.10MHz (400Hz Modulat., 100%)	100.10MHz	Ein Gleichstromrören-voltmeter zwishen TP202 und TP203 über eine Drosselspule verbinden. (Siehe Abb. 26)	T201 (Diskriminator FT)	1. Den Kern von T201 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
4		100.10MHz (400Hz Modulat., 100%)	100.10MHz	Klirrfaktor-Meßbrücke uber den Lautsprecher schließen	T202 (Diskriminator FT)	1. T202 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.
	JUSTIERUNG DES QUARZVERRIEGELUNGS-ANZEIGE-EIN-PEGELS					
5	UKW-MO an den UKW-Antennenanschluß anschließen. (16dB an den Antennenanschluß anlegen.)	100,1MHz (100% Modulation mit 400Hz)	100,10MHz	———	VR201	1. Gleichstrom-Voltmeter zwischen TP202 und TP203 anschließen, dann T201 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
	TRENNUNGS-JUSTIERUNG					
6	Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (Stereo-Pilotsignal 10% moduliert.)	100.10MHz (400Hz Modulat., 100%) L-oder R-Betriebs-art.)	100,10MHz	Oszilloskop oder Wechselstrom-Volt-meter über den Lautsprecher schließen.	VR302 (Trennungs)	1. VR302 auf minimale Anzeige des R-Ausgangs bei Stereomodulator in L (L-Kanalmodulation) Modus, und auf minimale Anzeige des L-Ausgangs in R-Modus abgleichen.
	UKW-STEREO-DEKODER-ABGLEICH					
	UNTER VERWENDUNG EINES ZAHLES			ALTERNATIV-MEB METHODE		
7	1. Unmodulierts Mono-Signal 100.1MHz in das Gerät speisen. 2. FM muting/mode-Schalter auf ''on/FM auto'' stellen. 3. Zähler über einen Widerstand 100k ohm an TP301 schließen. 4. **VR301** auf 19kHz ±30Hz einstellen.			1. Stereosignal entweder von einem Stereogenerator. Oder einem Sender einspeisen. 2. **VR301** so einstellen, bis die Stereolampe auf leuchtet. Schleifer von **VR301** sichern, wie in Abb. 28 gezeigt.		
	FM-ANALOG-FREQUENZMESSER					
8	———	Kein Signal	96,10 MHz	———	VR901 (Frequenzmesser)	1. VR901 so abgleichen, daß der Frequenzmesser 96,1 MHz anzeigt. (Siehe Abb. 29) 2. Anschließend mit dem Abstimmknopf so einstellen, daß auf der Digital-Frequenzanzeige 88,1 MHz und 107,9 MHz angezeigt werden. Dann überprüfen, daß die Anzeige mit jedem Buchstaben in Kontakt ist. 3. Falls die Anfordung in Schritt 2 nicht erfüllt wird, zu Schritt 1 zurückkehren und die Anzeige zwischen die gestrichelten Linien in Abb. 29 abgleichen.


MW-Meßsender
SA-310
GND
AM ANT
Oszilloskop
Kondensator
(200pF)

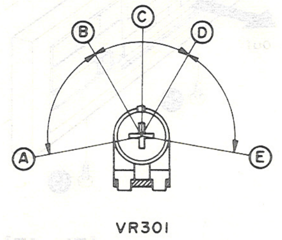
[Abb. 25]
Justierung der MW-HF


Gleichstromrörenvoltmeter
UKW-Meßsender
SA-310
TP203
TP202
D206
(75Ω)
FM ANT.
Spule (100μH)
(SLQX101-2D)

[Abb. 26]
Justierung der UKW-HF

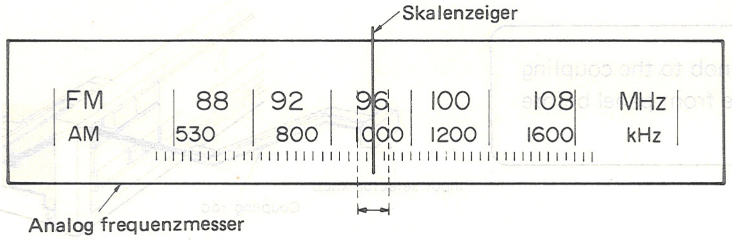

UKW-Meßsender
SA-310
TP301
R311
Signalfrequenzmesser
19. 00 kHz
(75Ω)
FM ANT.
UKW-Antennen-anschluß (75Ω)

[Abb. 27]
Justierung der UKW-MPX-VCO



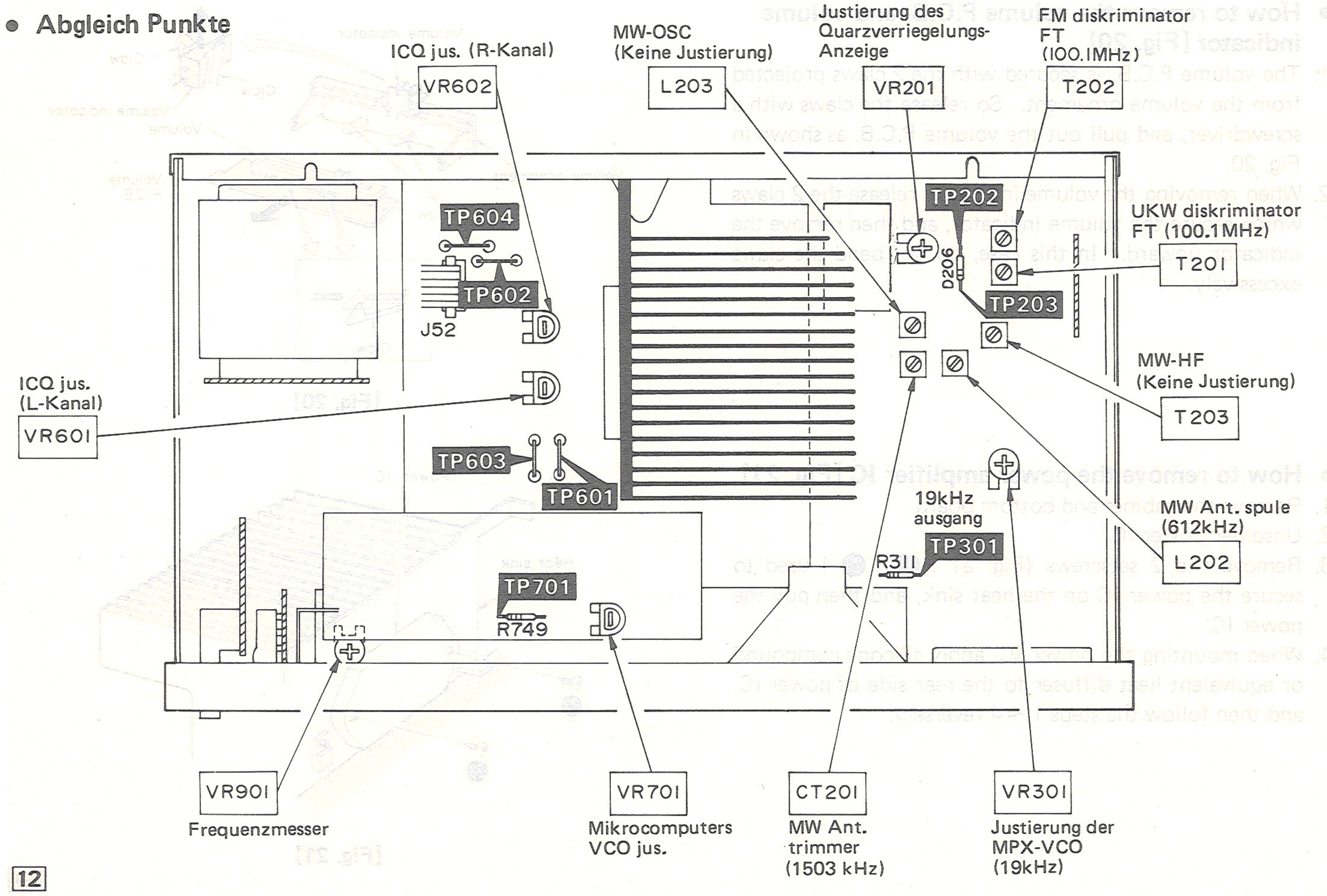
Ⓐ–Ⓑ, Ⓓ–Ⓔ : Stereo Aus-Position
Ⓑ–Ⓓ : Stereo Ein-Position (Anzeige leuchtet)
Ⓒ : Punkt der Pilot-Schaltung justieren

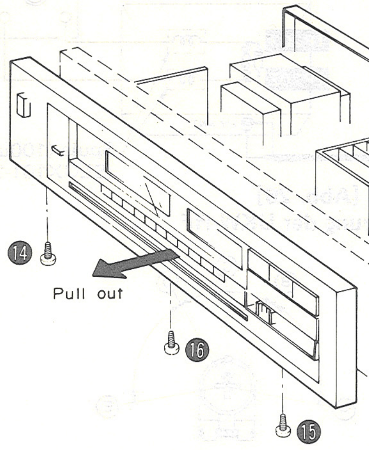
[Abb. 28]


Skalenzeiger
FM
88
92
96
100
108
MHz
AM
530
800
1000
1200
1600
kHz
Analog frequenzmesser

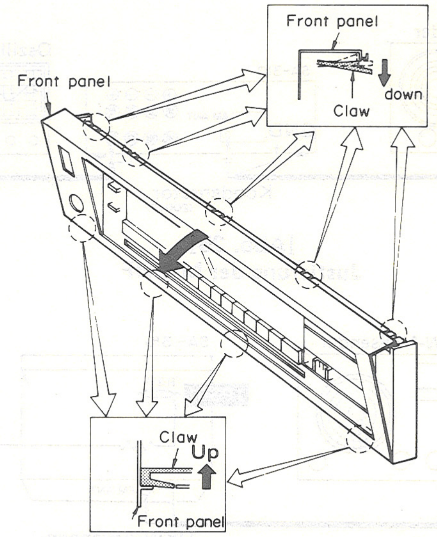
[Abb. 29]
UKW analog frequenzmesser

● Abgleich Punkte


ICQ jus. (R-Kanal)
VR602
MW-OSC
(Keine Justierung)
L203
Justierung des Quarzverriegelungs-Anzeige
VR201
FM diskriminator FT
(100.1MHz)
T202
TP604
TP602
J52
TP202
D206
TP203
UKW diskriminator FT (100.1MHz)
T201
ICQ jus.
(L-Kanal)
VR601
MW-HF
(Keine Justierung)
T203
TP603
TP601
19kHz ausgang
TP301
R311
MW Ant. spule
(612kHz)
L202
TP701
R749
VR901
Frequenzmesser
VR701
Mikrocomputers VCO jus.
CT201
MW Ant. trimmer
(1503 kHz)
VR301
Justierung der MPX-VCO
(19kHz)



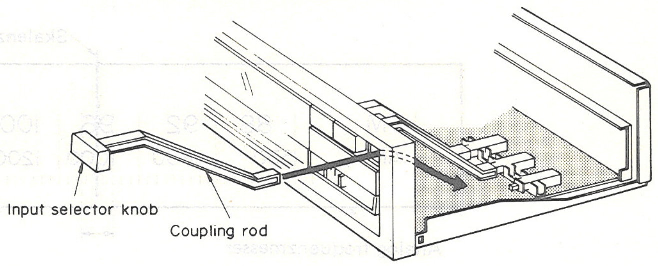
[Fig. 17]



[Fig. 18]

NOTE

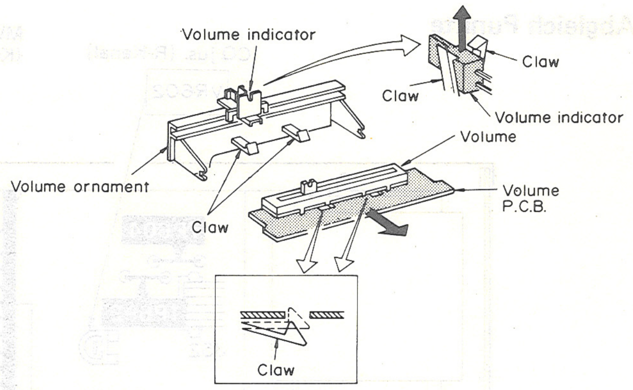
To set the input selector knob, fit the knob to the coupling rod as in Fig. 19, and set it through the front panel before attaching it to the switch.



[Fig. 19]

● How to remove the volume P.C.B. and volume indicator [Fig. 20]

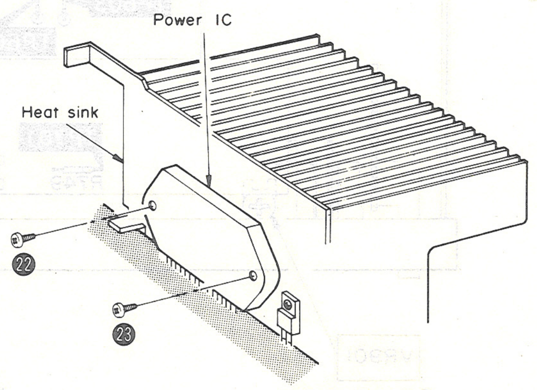
1. The volume P.C.B. is secured with the 2 claws projected from the volume ornament. So release the claws with a screwdriver, and pull out the volume P.C.B. as shown in Fig. 20.
2. When removing the volume indicator, release the 2 claws which secure the volume indicator, and then remove the indicator upward. In this case, do not bend the claws excessively.



[Fig. 20]

● How to remove the power amplifier IC [Fig. 21]

1. Remove the cabinet and bottom board.
2. Unsolder power IC.
3. Remove the 2 setscrews (Fig. 21 : ㉒, ㉓) used to secure the power IC on the heat sink, and then pull the power IC.
4. When mounting the power IC, apply silicone compound or equivalent heat diffuser to the rear side of power IC, and then follow the steps 1 ~ 4 reversely.



[Fig. 21]

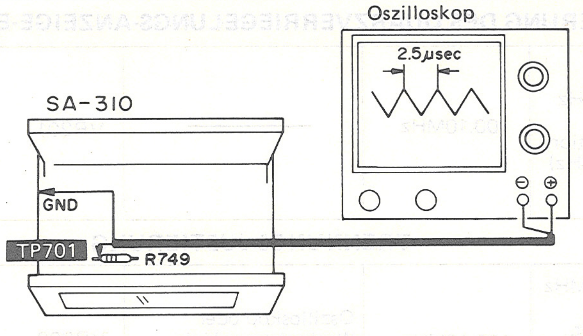
■ MESSUNGEN UND JUSTIERUNGEN

VERSTÄRKER-ABGLEICH

*** Einstellung der Regler und zu verwendende Instrumente.**

1. Vor dem Abgleich sollten VR601 und VR602 entgegen dem Uhrzeigersinn gedreht werden.
2. Haupt-Lautsprecherschalter. . . . . on
3. Neben-Lautsprecherschalter . . . . .off
4. Lautstärke. . . . . 0 (Minimum)
5. Gleichstrom-Voltmeter (für Messung von 5 mV fähig)
6. Oszilloskop

Nr.	ABGLEICHUNGEN	GLEICHSTROM-VOLTMETER-ANSCHLUSS	ZU JUSTIERENDE TEILE	ABGLEICH-METHODE
1	Abgleich von Icq	(L-Kanal) Zwischen TP601 (+) und TP603 (–).	VR601 (L-Kanal)	1. 8Ω-Ersatzwiderstand oder Lautsprecher mit 8Ω Impedanz an den Haupt-Lautsprecheranschluß anschließen. 2. Den Netzschalter einschalten und überprüfen, daß die AUTO-Leuchtdiode (grün) leuchtet. 3. VR601 (L-Kanal) oder VR602 (R-Kanal) so abgleichen, daß die Spannung an jedem Prüfpunkt 15 mV beträgt.
		(R-Kanal) Zwischen TP602 (+) und TP604 (–).	VR602 (R-Kanal)	
2	Abgleich von Vco des Mikrocomputers	————	VR701 (Abgleich von Vco des Mikrocomputers)	1. Oszilloskop an TP701 anschließen. 2. VR701 so abgleichen, daß die Periode der Wellenform 2,5 µsec beträgt. (Siehe Abb. 24)



[Abb. 24]

AM (MW)-EINSTELLUNG

Anmerkung: Die AM OSC-Spule (L203) und AM ZFT (T203) sind bereits justiert und benötigen keine Justierung.

● Stellungen und zu benutzende Geräte

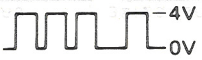
1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
2. AM (MW)-Meßsender (AM-SG)
3. Bereichsschalter . . . . . . AM
4. AM (MW) Wellenverteilungs-Wahlschalter auf Position "9 kHz" stellen.
5. Netzspannung auf ihren Sollwerthalten.
6. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute ablesung.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

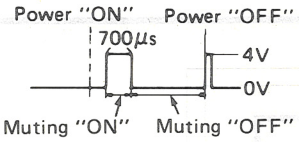
Nr.	AM (MW)-MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICHSVERFAHREN
	ANSCHLUSS	FREQUENZ				
	MW-HF-ABGLEICH					
1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenne-neingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	612 kHz (400 Hz Modulat., 30%)	612 kHz	Oszilloskop oder Wechselstrom-Voltmeter uber den Lautsprecher schließen	L202 (Ant. Spule)	1. Auf max. Ausgang abgleichen 2. Den Ferritkern von L202 mit einem Schraubendreher justieren.
2		1503 kHz (400Hz Modulat., 30%)	1503 kHz		CT201 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (1) und (2) wiederholen, bis die Frequenz genau mit der Skalenanzeige übereinstimmt.

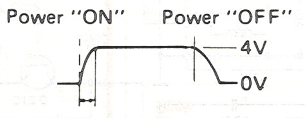
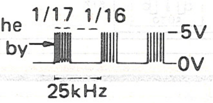
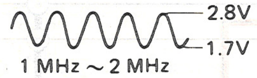
FUNCTION OF TERMINAL (IcQ CONTROLLER IC701)

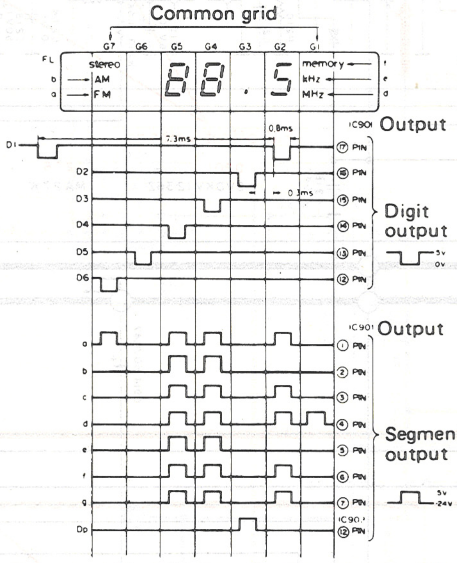
Pin No.	Mark	Name of block	Description of terminal
1	$\mathrm{V_{SS}}$	Power supply input terminal	Grounded (0V)
2	$\mathrm{CO_9}$	Output port C	It delivers Icq control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	$\mathrm{CO_8}$		
4	$\mathrm{CO_7}$		
5	$\mathrm{CO_6}$		
6	$\mathrm{CO_5}$		
7	$\mathrm{AI_3}$	Input port A	Grounded (0V)
8	$\mathrm{AI_2}$		When 100°C (212°F) sensor of power amplifier operates, the input level becomes "H".
9	$\mathrm{AI_1}$		Apply 5.6V
10	$\mathrm{AI_0}$		When 60°C (140°F) sensor of power amplifier operates, the input level becomes "L".
11	$\mathrm{BI_3}$	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
12	$\mathrm{BI_2}$		Input level changes to "L" as effective output 4V signal sensor of power amplifier operates.
13	$\mathrm{BI_1}$		Apply 5V
14	$\mathrm{BI_0}$		
15	$\mathrm{EO_0}$	Output port E	Not used in this unit.
16	$\mathrm{EO_1}$		
17	$\mathrm{EO_2}$		Indicator "auto" lights up at "L" output.
18	$\mathrm{EO_3}$		Not used in this unit.
19	TST	Test input terminal	Terminal for testing LSI (Grounded)
20	RST	Reset input terminal	All outputs are cleared or reset with input at "L". (It is connected to power supply circuit)
21	$\mathrm{SNS_0}$	Sensor input terminal	Not used in this unit.
22	$\mathrm{SNS_1}$		Input level changes to "H" as power amplifier output short-circuit detector operates.
23	$\mathrm{DO_0}$	Output port D	Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
24	$\mathrm{DO_1}$		Not used in this unit.
25	$\mathrm{DO_2}$		
26	$\mathrm{DO_3}$		Output muting circuit to turns ON with output at "H".
27	$\mathrm{V_{DD}}$	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 30)
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. (Refer to Fig. 30)
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	

Pin No.	Mark	Description of terminal
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level.  Power "ON" Power "OFF" 700μs 4V 0V Muting "ON" Muting "OFF"
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.

Pin No.	Mark	Description of terminal
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.  The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. Pulse two times larger than the value that cannot be divided by VCO/16. 
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	This is 4-bit input/output port. PB2 terminal (35), is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. Other terminals are not used in this unit.
34	PB1	
35	PB2	
36	PB3	
37	PA0	This is 4-bit input/output port. (Not used in this unit)
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.



[Fig. 30]

■ RESISTORS & CAPACITORS

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by △ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The " S " mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω(ohm), K = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = 10^{-6} μF
6. Bracketed indications in Ref. No. columns spedify the area. Parts without these indications can be used for all areas.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value
ERG	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ± 5%
ERG : Metal Oxide	12 : 1/2W	K : ± 10%
ERQ : Fuse Type	25 : 1/4W	
Metal	1 : 1W	
ERC : Solid	2 : 2W	
	S1 : 1/2W	

ERD10TLJ □□□ → Chip type carbon
ERO10MKG □□□ → Chip type metal film

Numbering System of Capacitor

Example

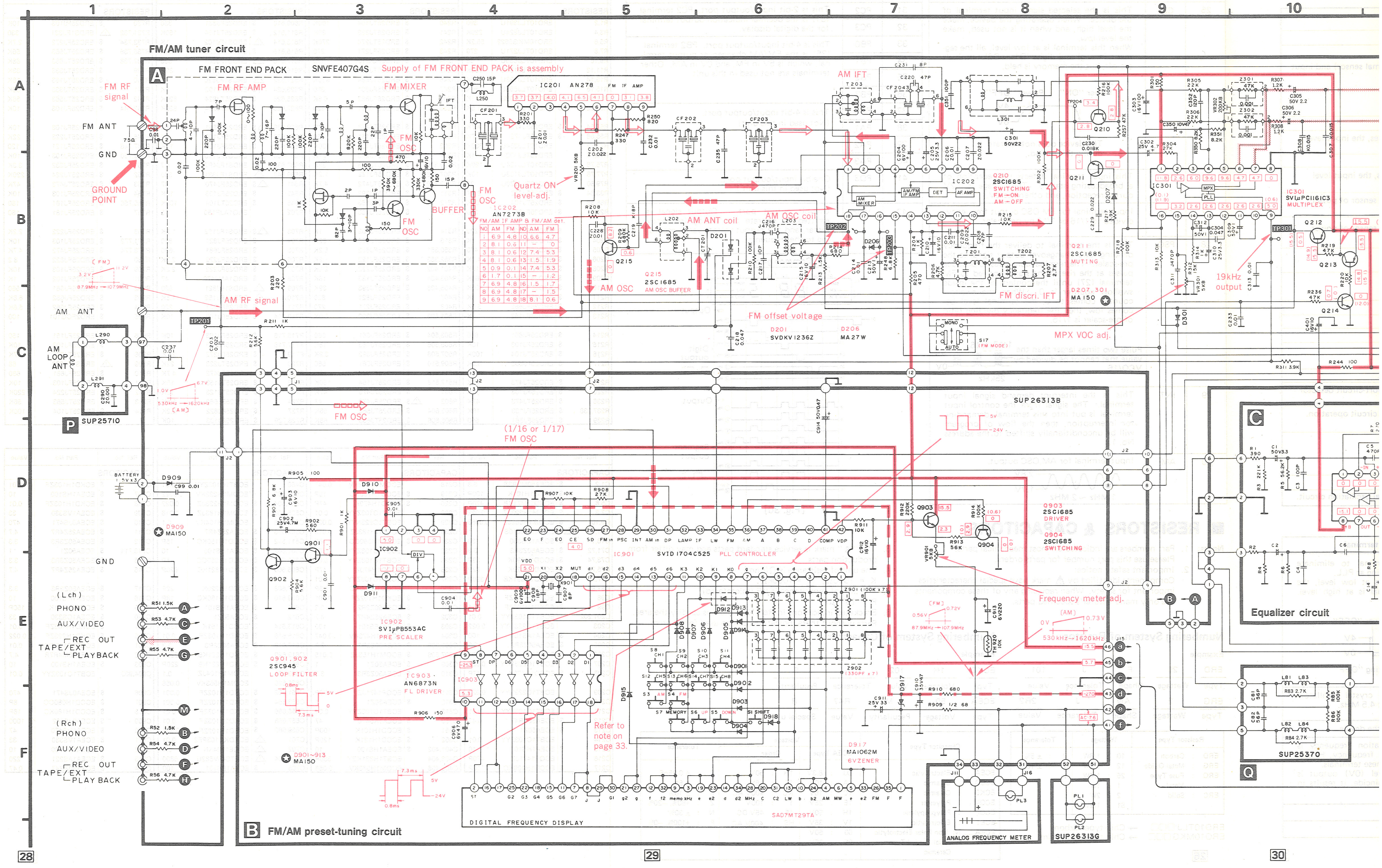
ECKD	1H	102	Z	F
Type	Volgage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity	Value	Special use

Capacitor Type	Voltage		Tolerance
	ECEA Type	Order	
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	J : ± 5%
ECKD : Ceramic	1C : 16V	KC : 400V AC	K : ± 10%
ECQM : Polyester	1E : 25V	1 : 100V	Z : +80%, –20%
ECQP : Polypropylene	1H : 50V	45 : 45V DC	N : ± 30%
ECET : Electrolytic	1V : 35V	HS : 400V AC	P : +100%, –0%
ECEA..... N: Non Polar Electrolytic	50 : 50V		
ECBT : Axial Leaded Type Ceramic	25 : 25V		

Ref. No.	Part No.	Value
RESISTORS		
R1,2	ERD10TLJ391U	390
R3,4	ERD10TLJ224U	220K
R5,6	ERO10MKG5622	56.2K
R7,8	ERD10TLJ271U	270
R9,10	ERD10TLJ680U	68
R11,12	ERD10TLJ184U	180K
R13,14	ERD10TLJ123U	12K
R15,16	ERD10TLJ563U	56K
R17,18	ERD10TLJ102U	1K
R51,52 S	ERD25FJ152	1.5K
R53,54 S	ERD25FJ472	4.7K
R55,56 S	ERD25FJ472	4.7K
R71,72	ERD10TLJ334U	330K
R73,74	ERD10TLJ102U	1K
R75,76	ERD10TLJ124U	120K
R77,78	ERD10TLJ103U	10K
R79,80	ERD10TLJ220U	22
R83,84 S	ERD25FJ272	2.7K
R85,86 S	ERD25TJ104	100K
R201 S	ERD25FJ331	330
R203 S	ERD25FJ221	220
R204 S	ERD25FJ102	1K
R205 S	ERD25FJ471	470
R206 S	ERD25FJ472	4.7K
R208 S	ERD25FJ103	10K
R209 S	ERD25TJ684	680K
R210 S	ERD25TJ104	100K
R211 S	ERD25FJ102	1K
R212 S	ERD25FJ562	5.6K
R213 S	ERD25FJ152	1.5K
R214 S	ERD25FJ681	680
R215 S	ERD25FJ103	10K
R216 S	ERD25TJ104	100K
R217 S	ERD25FJ392	3.9K
R218 S	ERD25TJ104	100K
R219 S	ERD25TJ473	47K
R220 S	ERD25FJ103	10K
R236 S	ERD25TJ473	47K
R237,238 S	ERD25FJ103	10K
R239 S	ERD25FJ561	560
R240 S	ERD25TJ104	100K
R241 S	ERD25TJ333	33K
R242 S	ERD25TJ274	270K
R243 S	ERD25FJ271	270
R244 S	ERD2FCG101	100
R245 S	ERD25TJ104	100K
R246 S	ERD25TJ684	680K
R247 S	ERD25FJ331	330
R248 S	ERD25FJ682	6.8K
R250 S	ERD25FJ821	820
R257 S	ERD25TJ473	47K
R301 S	ERD25FJ151	150
R302 S	ERD25TJ104	100K
R304 S	ERD25TJ273	27K
R305,306 S	ERD25TJ223	22K
R307,308 S	ERD25FJ122	1.2K
R309,310 S	ERD25TJ472	4.7K
R311 S	ERD25FJ392	3.9K
R312 S	ERD25TJ153	15K
R313 S	ERD25FJ103	10K
R314 S	ERD25FJ102	1K
R315 S	ERD25TJ823	82K
R350,351 S	ERD25FJ822	8.2K
R352,353 S	ERD25FJ122	1.2K
R401,402 S	ERD25FJ222	2.2K
R403,404 S	ERD25TJ183	18K
R405,406 S	ERD25TJ393	39K
R407 S	ERD25FJ821	820
R408 S	ERD25FJ271	270
R501,502 S	ERD25FJ392	3.9K
R503,504 S	ERD25FJ561	560
R505,506 S	ERD25TJ183	18K
R507,508 S	ERD25FJ392	3.9K
R509,510 S	ERD25FJ561	560
R511,512 S	ERD25TJ123	12K
R517,518 S	ERD25TJ154	150K
R601 S	ERD25TJ473	47K
R602 △S	ERD25FJ470	47
R603,604 S	ERD25TJ563	56K
R605,606 S	ERD25TJ683	68K
R609,610 S	ERD25FJ331	330
R611,612 S	ERD25TJ154	150K
R613,614 △	ERDS1FJ102	1K
R615,616 S	ERD25FJ222	2.2K
R617,618 △	ERDS1FJ561	560
R619,620 S	ERD25TJ393	39K
R621,622 △	ERDS1FJ820	82
R623,624 S	ERD25FJ102	1K
R625,626 S	ERD25TJ824	820K
R627,628 S	ERD25TJ824	820K
R629,630 △S	ERD25FJ561	560
R631,632 △S	ERD25FJ102	1K
R633,634 S	ERD25FJ103	10K
R635,636 △	ERDS1FJ100	10
R637,638 △	ERDS1FJ4R7	4.7
R639,640 △	ERDS1FJ331	330
R641 △S	ERD25FJ470	47
R642 S	ERD25FJ103	10K
R645 S	ERD25TJ104	100K
R702	ERQ1AJP150	15
R703 △S	ERDS1FJ152	1.5K
R704 S	ERD25FJ821	820
R705 S	ERD25FJ681	680
R706 S	ERD25FJ272	2.7K
R707 S	ERD25FJ222	2.2K
R708 S	ERG1ANJ470	47
R709 △	ERDS1FJ821	820
R710 △	ERDS1FJ152	1.5K
R711 S	ERD25FJ221	220
R713,714 S	ERD25FJ103	10K
R715,716 S	ERD25FJ103	10K
R717,718 S	ERD25FJ103	10K
R719 S	ERD25FJ272	2.7K
R720 S	ERD25TJ223	22K
R721 S	ERD25FJ472	4.7K
R722 S	ERD25TJ153	15K
R723 S	ERD25TJ123	12K
R724 S	ERD25FJ562	5.6K
R727 S	ERD25FJ822	8.2K
R728,729 S	ERD25FJ103	10K
R730 S	ERD25FJ103	10K
R731,732 △	ERDS1FJ331	330
R733,734 S	ERD25FJ272	2.7K
R735,736 S	ERD25TJ563	56K
R737,738 S	ERD25TJ683	68K
R739 S	ERD25TJ333	33K
R740 S	ERD25TJ183	18K
R741 S	ERD25TJ333	33K
R742 S	ERD25TJ563	56K
R743,744 S	ERD25FJ103	10K
R745 S	ERD25FJ103	10K
R746 S	ERD25TJ223	22K
R747,748 S	ERD25FJ121	120
R749,750 S	ERD25FJ103	10K
R751 S	ERD25FJ332	3.3K
R752 S	ERD25TJ224	220K
R753 S	ERD25TJ473	47K
R754 S	ERD25FJ103	10K
R755,756 S	ERD25FJ181	180
R757 S	ERD25FJ181	180
R758 S	ERD25FJ222	2.2K
R771,772 S	ERD25FJ103	10K
R773,774 S	ERD25FJ472	4.7K
R780 S	ERD25FJ822	8.2
R799 S	ERD25FJ103	10K
R901 S	ERD25FJ102	1K
R902 S	ERD25FJ561	560
R903 S	ERD25FJ682	6.8K
R904 S	ERD25FJ562	5.6K
R905 S	ERD2FCG101	100
R906 S	ERD25FJ151	150
R907 S	ERD25FJ103	10K
R908 S	ERD25TJ273	27K
R909 △	ERDS1FJ680	68
R910 S	ERD25FJ681	680
R911 S	ERD25FJ103	10K
R912 S	ERD25TJ224	220K
R913 S	ERD25TJ563	56K
R914 S	ERD25TJ104	100K

Ref. No.	Part No.	Value
CAPACITORS		
C1,2 S	ECEA50M3R3R	3.3
C3,4 S	ECCD1H101K	100P
C5,6 S	ECKD1H471KB	470P
C7.8 S	ECQM1H223JZ	0.022
C9,10 S	ECQM1H682JZ	0.0068
C11,12 △S	ECEA1HN010S	1
C13,14 S	ECEA1CS330	33
C71,72 S	ECEA50Z3R3	3.3
C73,74 S	ECCD1H390K	39P
C75,76 S	ECCD1H820K	82P
C77,78 S	ECKD1H391KB	390P
C81,82 S	ECCD1H560KC	56p
C98	ECKD1H103ZF	0.01
C99 S	ECKD1H103ZF	0.01
C201,202	ECBT1C103ZYY	0.01
C203	ECBT1C223NYY	0.022
C204 S	ECEA1AS101	100
C205 S	ECEA50Z3R3	3.3
C206	ECBT1C103ZYY	0.01
C207	ECBT1C223NYY	0.022
C208 S	ECCD1H470K	47P
C209	ECBT1C223NYY	0.022
C210 S	ECEA1HS100	10
C211	ECBT1C103ZYY	0.01
C212 S	ECEA50ZR47	0.47
C213 S	ECEA50Z1	1
C214	ECBT1C103ZYY	0.01
C215 S	ECEA1HS100	10
C216	ECQP1471JZ	470P
C217 S	ECCD1H100KC	10P
C218	ECQM1H473KV	0.047
C219 S	ECCD1H180KC	18P
C220 S	ECCD1H470K	47P
C228	ECBT1C103ZYY	0.01
C229	ECBT1C223NYY	0.022
C230 S	ECQM1H183JZ	0.018
C231 S	ECCD1H080CC	8P
C232	ECBT1C103ZYY	0.01
C233	ECBT1C103ZYY	0.01
C235 S	ECCD1H470K	47P
C237	ECBT1C103ZYY	0.01
C250	ECCD1H150KC	15P
C290 S	ECKD1H102ZF	0.001
C301 S	ECEA50Z2R2	2.2
C302 S	ECEA25Z4R7	4.7
C303 S	ECEA1ES101	100
C304	ECQM1H473KV	0.047
C305,306 S	ECEA50Z2R2	2.2
C307,308 S	ECQM1H153JZ	0.015
C309 S	ECEA50Z1	1
C310 S	ECEA50Z3R3	3.3
C311	ECQP1471JZ	470P
C312 S	ECEA50Z1	1
C313	ECBT1C103ZYY	0.01
C350 S	ECEA1AS470	47
C351 S	ECCD1H101K	100P
C352 S	ECCD1H121K	120P
C401,402 S	ECEA1HS100	10
C403,404	ECBT1H331KBY	330P
C405,406	ECQM1H563KV	0.056
C450	ECBT1C103ZYY	0.01
C501,502	ECQM1H222KV	0.0022
C503,504 S	ECQM1H223JZ	0.022
C505,506 S	ECQM1H183JZ	0.018
C507,508	ECQM1H104KV	0.1
C509,510 S	ECEA25Z4R7	4.7
C511,512 S	ECCD1H150KC	15P
C601,602 S	ECEA1HS100	10
C603,604 S	ECCD1H050CC	5P
C605,606 S	ECKD1H821KB	820P
C607,608 S	ECCD1H220K	22P
C609,610 S	ECCD1H180KC	18P
C611 S	ECEA1HS101	100
C612 S	ECEA50Z1	1
C613,614 S	ECCD1H151K	150P
C615,616 S	ECKD1H103ZF	0.01
C617,618 S	ECEA50Z3R3	3.3
C619,620 S	ECKD1H221KB	220P
C621,622 S	ECKD1H221KB	220P
C623,624	ECQM1H104JZ	0.1
C625,626	ECQM1H563KV	0.056
C651,652 S	ECKD1H102ZF	0.001
C653,654 S	ECKD1H102ZF	0.001
C655,656 S	ECKD1H103ZF	0.01
C657,658 S	ECKD1H103ZF	0.01
C659,660 S	ECKD1H102ZF	0.001
C701 △	ECKDKC103PF2	0.01
C702 △	ECQE1104KN	0.1
C703,704 △	ECETS45V682U	6800
C705 S	ECEA1ES101	100
C706 S	ECKD1H103ZF	0.01
C707 S	ECEA1HS100	10
C708 S	ECKD1H103ZF	0.01
C709 S	ECEA1VS330	33
C710 S	ECEA0JS471	470
C711 S	ECEA25Z4R7	4.7
C712 S	ECEA50Z3R3	3.3
C713,714 S	ECEA50Z1	1
C715 S	ECEA50Z3R3	3.3
C716 S	ECEA25Z4R7	4.7
C717 S	ECEA50Z3R3	3.3
C718 S	ECEA1HS100	10
C719 S	ECCD1H151K	150P
C720 S	ECEA1CS330	33
C721 S	ECKD1H103ZF	0.01
C750 S	ECKD1H223ZF	0.022
C901	ECBT1C103ZYY	0.01
C902 S	ECEA50M4R7R	4.7
C903 S	ECEA1HS100	10
C904,905	ECBT1C103ZYY	0.01
C906 S	ECEA0JS471	470
C907 S	ECCD1H080CC	8P
C908 S	ECCD1H180KC	18P
C909 S	ECEA0JS102	1000
C910 S	ECEA1HS470	47
C911 S	ECEA1VS330	33
C912 S	ECEA1HS100	10
C913 S	ECEA1AS221	220
C914 S	ECEA50ZR47	0.47

SCHEMATIC DIAGRAM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A
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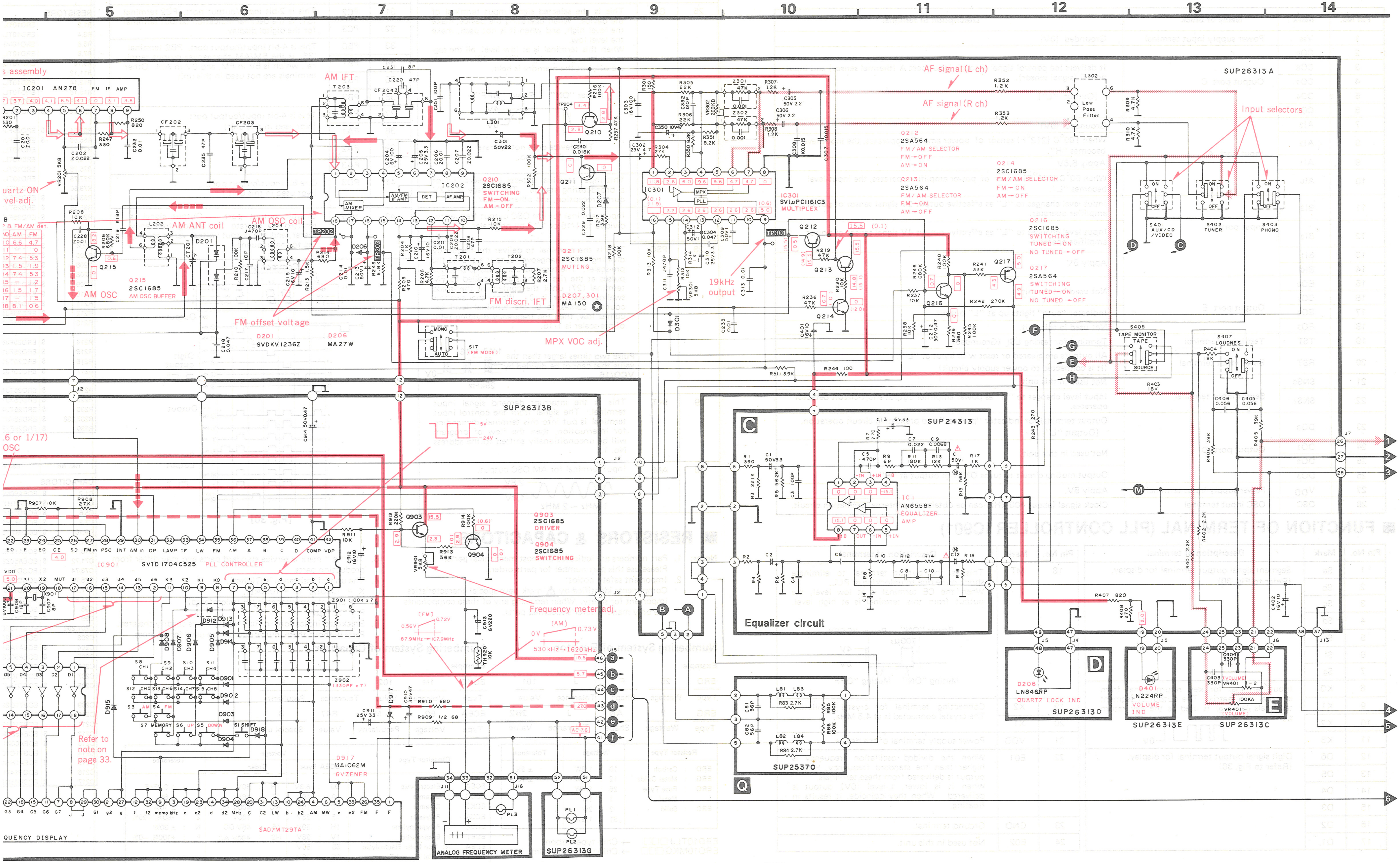
FM/AM tuner circuit
A
FM FRONT END PACK
SNVFE407G4S
Supply of FM FRONT END PACK is assembly
FM RF AMP
FM MIXER
FM RF signal
FM ANT
75Ω
GND
GROUND POINT
FM OSC
BUFFER
FM OSC
Quartz ON level-adj.
IC201 AN278 FM IF AMP
IC202 AN7273B FM/AM IF AMP & FM/AM det.
AM IFT
AM ANT coil
AM OSC coil
AM OSC
Q215 2SC1685 AM OSC BUFFER
FM offset voltage
D201 SVDKV1236Z
D206 MA27W
FM discri. IFT
Q210 2SC1685 SWITCHING FM→ON AM→OFF
Q211 2SC1685 MUTING
D207, 301 MA150
IC301 SVIμPC1161C3 MULTIPLEX
MPX VOC adj.
19kHz output
S17 (FM MODE) MONO AUTO
AM RF signal
AM ANT
AM LOOP ANT
P
SUP25710
TP201
TP202
TP203
TP204
TP301
FM OSC
(1/16 or 1/17) FM OSC
BATTERY 1.5V×3
D909 MA150
IC902 SVIμPB553AC PRE SCALER
Q901, 902 2SC945 LOOP FILTER
IC903 AN6873N FL DRIVER
D901~913 MA150
IC901 SVID1704C525 PLL CONTROLLER
SUP26313B
Q903 2SC1685 DRIVER
Q904 2SC1685 SWITCHING
Frequency meter adj.
D917 MA1062M 6V ZENER
Refer to note on page 33.
S1 SHIFT
S7 MEMORY
DIGITAL FREQUENCY DISPLAY
SAD7MT29TA
ANALOG FREQUENCY METER
SUP26313G
B
FM/AM preset-tuning circuit
GND
(Lch) PHONO
AUX/VIDEO
TAPE/EXT REC OUT
PLAY BACK
(Rch) PHONO
AUX/VIDEO
TAPE/EXT REC OUT
PLAY BACK
C
Equalizer circuit
Q
SUP25370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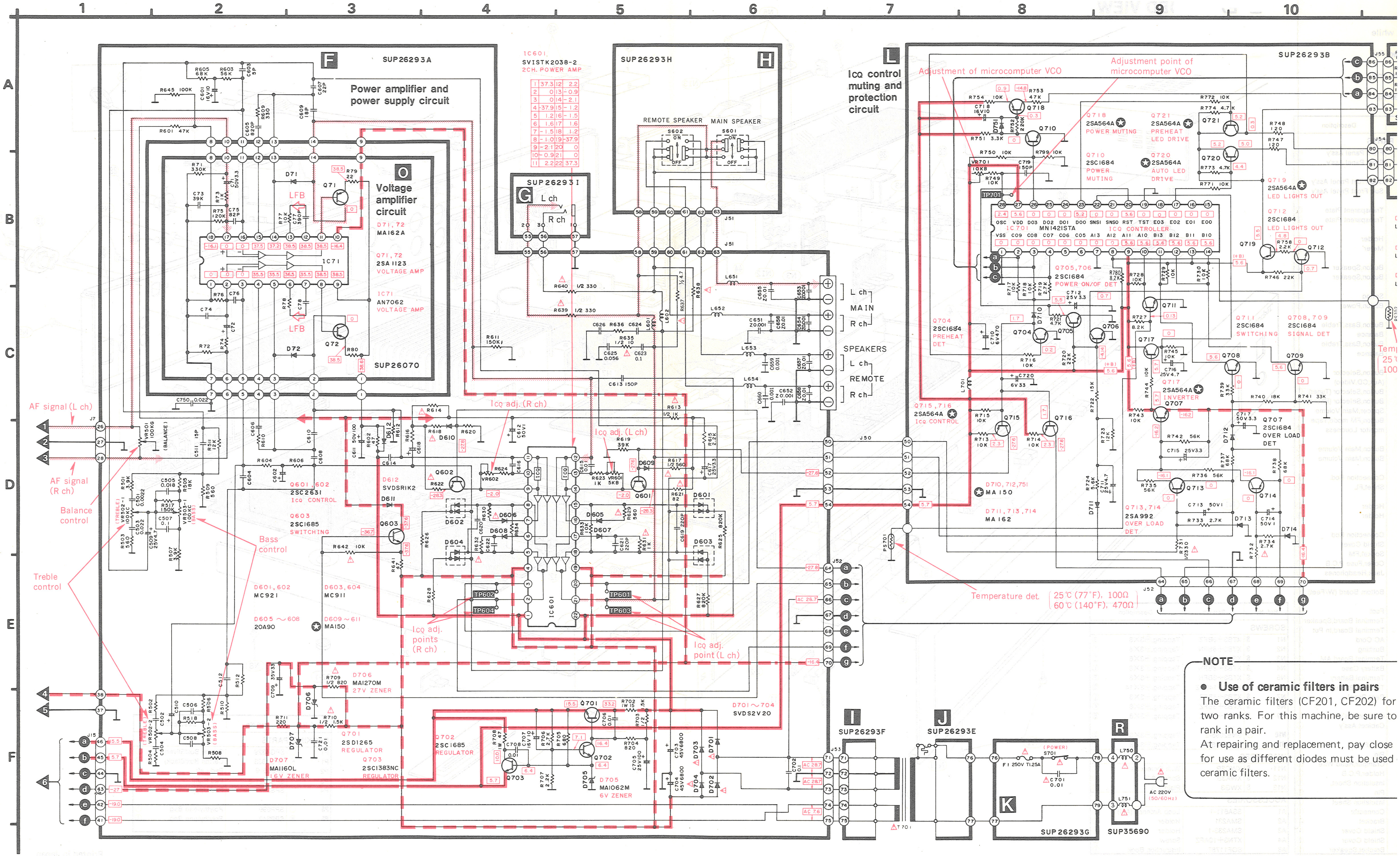
14
s assembly
IC201 AN278 FM IF AMP
AM IFT
T203
CF202
CF203
L301
Q210
2SC1685
SWITCHING
FM→ON
AM→OFF
IC202
AM MIXER
AM/FM IF AMP
DET
AF AMP
uartz ON
vel-adj.
AM ANT coil
AM OSC coil
L202
L203
TP202
TP203
D201
D206
Q215
2SC1685
AM OSC BUFFER
AM OSC
T201
T202
FM discri. IFT
FM offset voltage
D201
SVDKV1236Z
D206
MA27W
Q211
2SC1685
MUTING
D207, 301
MA150
MONO
AUTO
S17
(FM MODE)
MPX VOC adj.
IC301
SVIμPC1161C3
MULTIPLEX
TP301
MPX
PLL
19kHz output
AF signal (L ch)
AF signal (R ch)
L302
Low Pass Filter
SUP26313A
Input selectors
Q212
2SA564
FM/AM SELECTOR
FM→OFF
AM→ON
Q213
2SA564
FM/AM SELECTOR
FM→ON
AM→OFF
Q214
2SC1685
FM/AM SELECTOR
FM→ON
AM→OFF
Q216
2SC1685
SWITCHING
TUNED→ON
NO TUNED→OFF
Q217
2SA564
SWITCHING
TUNED→ON
NO TUNED→OFF
S401
AUX/CD
/VIDEO
S402
TUNER
S403
PHONO
S405
TAPE MONITOR
TAPE
SOURCE
S407
LOUDNES
ON
OFF
SUP26313B
.6 or 1/17)
OSC
IC901
SVI1704C525
PLL CONTROLLER
Q903
2SC1685
DRIVER
Q904
2SC1685
SWITCHING
Frequency meter adj.
[FM]
0.72V
0.56V
87.9MHz→107.9MHz
(AM)
0.73V
0V
530kHz→1620kHz
D917
MA1062M
6VZENER
SUP24313
C
IC1
AN6558F
EQUALIZER
AMP
Equalizer circuit
SUP25370
Q
D208
LN846RP
QUARTZ LOCK IND
SUP26313D
D
D401
LN224RP
VOLUME
IND
SUP26313E
VR401
100KA
(VOLUME)
SUP26313C
E
Refer to
note on
page 33.
QUENCY DISPLAY
SAD7M T29TA
ANALOG FREQUENCY METER
PL1
PL2
PL3
SUP26313G
S8 CH1
S9 CH2
S10 CH3
S11 CH4
S12 CH5
S13 CH6
S14 CH7
S15 CH8
S3 AM
S4 FM
S7 MEMORY
S6 UP
S5 DOWN
S1 SHIFT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A
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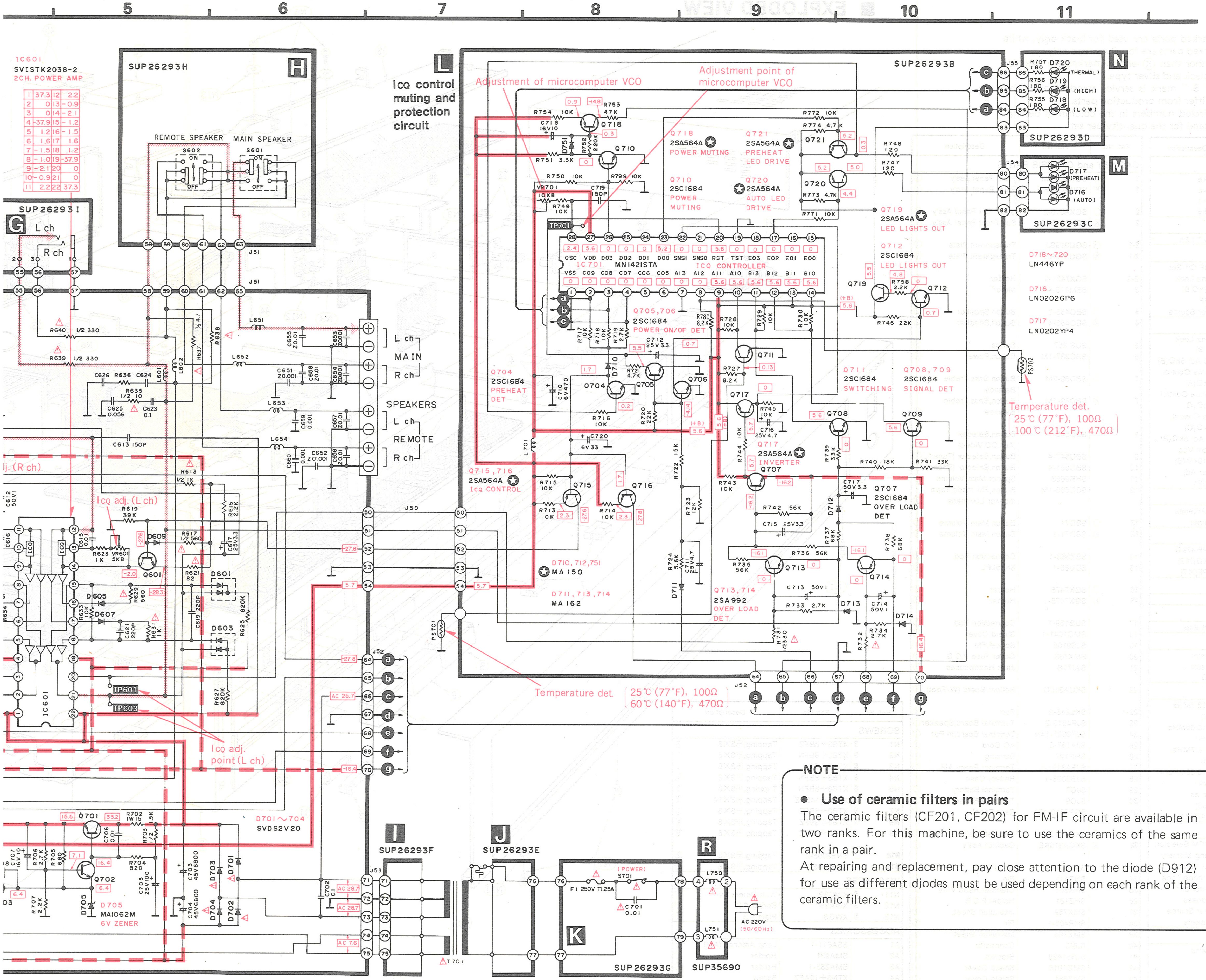
C
D
E
F
F
SUP26293A
Power amplifier and power supply circuit
O
Voltage amplifier circuit
D71, 72
MA162A
Q71, 72
2SA1123
VOLTAGE AMP
IC71
AN7062
VOLTAGE AMP
SUP26070
LFB
IC601
SVISTK2038-2
2CH. POWER AMP
G
SUP26293I
L ch
R ch
H
SUP26293H
REMOTE SPEAKER
MAIN SPEAKER
S602
S601
ON
OFF
L
Icq control muting and protection circuit
SPEAKERS
L ch
MAIN
R ch
L ch
REMOTE
R ch
SUP26293B
Adjustment of microcomputer VCO
Adjustment point of microcomputer VCO
Q718
2SA564A
POWER MUTING
Q721
2SA564A
PREHEAT LED DRIVE
Q710
2SC1684
POWER MUTING
Q720
2SA564A
AUTO LED DRIVE
Q719
2SA564A
LED LIGHTS OUT
Q712
2SC1684
LED LIGHTS OUT
IC701
MN1421STA
Icq CONTROLLER
Q705, 706
2SC1684
POWER ON/OFF DET
Q704
2SC1684
PREHEAT DET
Q711
2SC1684
SWITCHING
Q708, 709
2SC1684
SIGNAL DET
Q717
2SA564A
INVERTER
Q715, 716
2SA564A
Icq CONTROL
Q707
2SC1684
OVER LOAD DET
D710, 712, 751
MA150
D711, 713, 714
MA162
Q713, 714
2SA992
OVER LOAD DET
Temperature det.
25℃ (77°F), 100Ω
60℃ (140°F), 470Ω
AF signal (L ch)
AF signal (R ch)
Balance control
Bass control
Treble control
Q601, 602
2SC2631
Icq CONTROL
Q603
2SC1685
SWITCHING
D612
SVDSRIK2
D611
D601, 602
MC921
D603, 604
MC911
D605 ~ 608
2OA90
D609 ~ 611
MA150
Icq adj. (R ch)
Icq adj. (L ch)
Icq adj. points (R ch)
Icq adj. point (L ch)
TP601
TP602
TP603
TP604
D706
MA1270M
27V ZENER
Q701
2SD1265
REGULATOR
Q702
2SC1685
REGULATOR
Q703
2SC1383NC
REGULATOR
D707
MA1160L
16V ZENER
D705
MA1062M
6V ZENER
D701 ~ 704
SVDS2V20
I
SUP26293F
J
SUP26293E
K
SUP26293G
R
SUP35690
(POWER)
S701
F1 250V T1.25A
C701 0.01
AC 220V (50/60Hz)
T701
L750
L751
J50
J51
J52
J53
J15
J54
J55
J7
PS701
VR501 100KG (BALANCE)
VR502-1 100KC (TREBLE)
VR502-2 (TREBLE)
VR503-1 100KC (BASS)
VR503-2 (BASS)

NOTE

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202) for two ranks. For this machine, be sure to rank in a pair.

At repairing and replacement, pay close for use as different diodes must be used ceramic filters.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IC601
SVISTK2038-2
2CH. POWER AMP
SUP26293H
H
REMOTE SPEAKER
MAIN SPEAKER
S602
S601
SUP26293I
G
L ch
R ch
L
Icq control muting and protection circuit
Adjustment of microcomputer VCO
Adjustment point of microcomputer VCO
SUP26293B
Q718 2SA564A POWER MUTING
Q721 2SA564A PREHEAT LED DRIVE
Q710 2SC1684 POWER MUTING
Q720 2SA564A AUTO LED DRIVE
Q719 2SA564A LED LIGHTS OUT
Q712 2SC1684 LED LIGHTS OUT
IC701 MN1421STA ICQ CONTROLLER
TP701
Q705,706 2SC1684 POWER ON/OF DET
Q704 2SC1684 PREHEAT DET
Q711 2SC1684 SWITCHING
Q708,709 2SC1684 SIGNAL DET
Q717 2SA564A INVERTER
Q707 2SC1684 OVER LOAD DET
Q715,716 2SA564A Icq CONTROL
Q713,714 2SA992 OVER LOAD DET
D710,712,751 MA150
D711,713,714 MA162
Temperature det. 25℃ (77°F), 100Ω 100℃ (212°F), 470Ω
Temperature det. 25℃ (77°F), 100Ω 60℃ (140°F), 470Ω
SUP26293D
N
D720 (THERMAL)
D719 (HIGH)
D718 (LOW)
M
SUP26293C
D717 (PREHEAT)
D716 (AUTO)
D718~720 LN446YP
D716 LN0202GP6
D717 LN0202YP4
L ch MAIN R ch
SPEAKERS
L ch REMOTE R ch
Icq adj. (L ch)
Icq adj. point (L ch)
j. (R ch)
TP601
TP603
Q601
D601
D603
D605
D607
J50
J51
J52
J53
J54
J55
Q701
Q702
D701~704 SVDS2V20
D705 MA1062M 6V ZENER
I
SUP26293F
J
SUP26293E
K
SUP26293G
S701 (POWER)
F1 250V T1.25A
R
SUP35690
L750
L751
AC 220V (50/60Hz)
T701

SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

*The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

NOTE

1. **S1** : FM frequency-shift selector switch.
   off↔+25 kHz
2. **S3, 4** : Band selector switch
   [S3 —— AM
   S4 —— FM]
3. **S5, 6** : Tuning switch.
   [S5 —— down (tuning to lower frequency)
   S6 —— up (tuning to higher frequency)]
4. **S7** : Memory switch.
5. **S8 ~ 15** : Preset tuning switch.
   [S8 —— CH. 1 S12 —— CH. 5
   S9 —— CH. 2 S13 —— CH. 6
   S10 —— CH. 3 S14 —— CH. 7
   S11 —— CH. 4 S15 —— CH. 8]
6. **S17** : FM mode selector switch. (auto↔mono)
7. **S401 ~ 403** : Input selector switch in "**tuner**" position.
   [S401 —— phono
   S402 —— tuner
   S403 —— aux]
8. **S405** : Tape-monitor selector switch in "**source**" position.
9. **S407** : Loudness switch in "**off**" position.
10. **S601** : Main speaker switch in "**off**" position.
11. **S602** : Remote speaker switch in "**on**" position.
12. **S701** : Power source switch in "**on**" position.
13. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    - * Figures in ▭ stand for DC voltage in FM signal (no signal) mode.
    - * Figures in < > stand for DC voltage in FM stereo signal reception mode.
    - * Figures in ( ) stand for DC voltage in AM signal reception mode.
14. ▬ Positive (+B) voltage lines ⇨ AF signal lines
    ⇨ FM signal □□□□⇨ FM IF signal
    ➡ AM signal ■■■■➡ AM IF signal
    ■■■■■■■■ Negative (−B) voltage lines.
15. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety.
    When replacing any of these components use only manufacturer's specified parts.

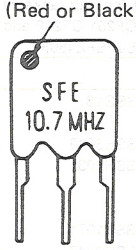
NOTE

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.

At repairing and replacement, pay close attention to the diode (D912) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking (Red or Black)



RANK (Color)	D912	CENTER FREQUENCY
Red	X	10.70 MHz
Black	○	10.65 MHz

Note: ○ Mark Diode is used.
X Mark Diode is not used.

REPLACEMENT PARTS LIST

Notes:
1. Part number are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Ⓚ -marked parts are used for black only, while ○-marked parts are for silver type only.
4. Part other than Ⓚ -and ○-marked are used for both black and silver type.
5. The " **S** " mark is service standard•parts and may differ from production parts.
6. The circled numbers in the column of description stand for the quantity per set.

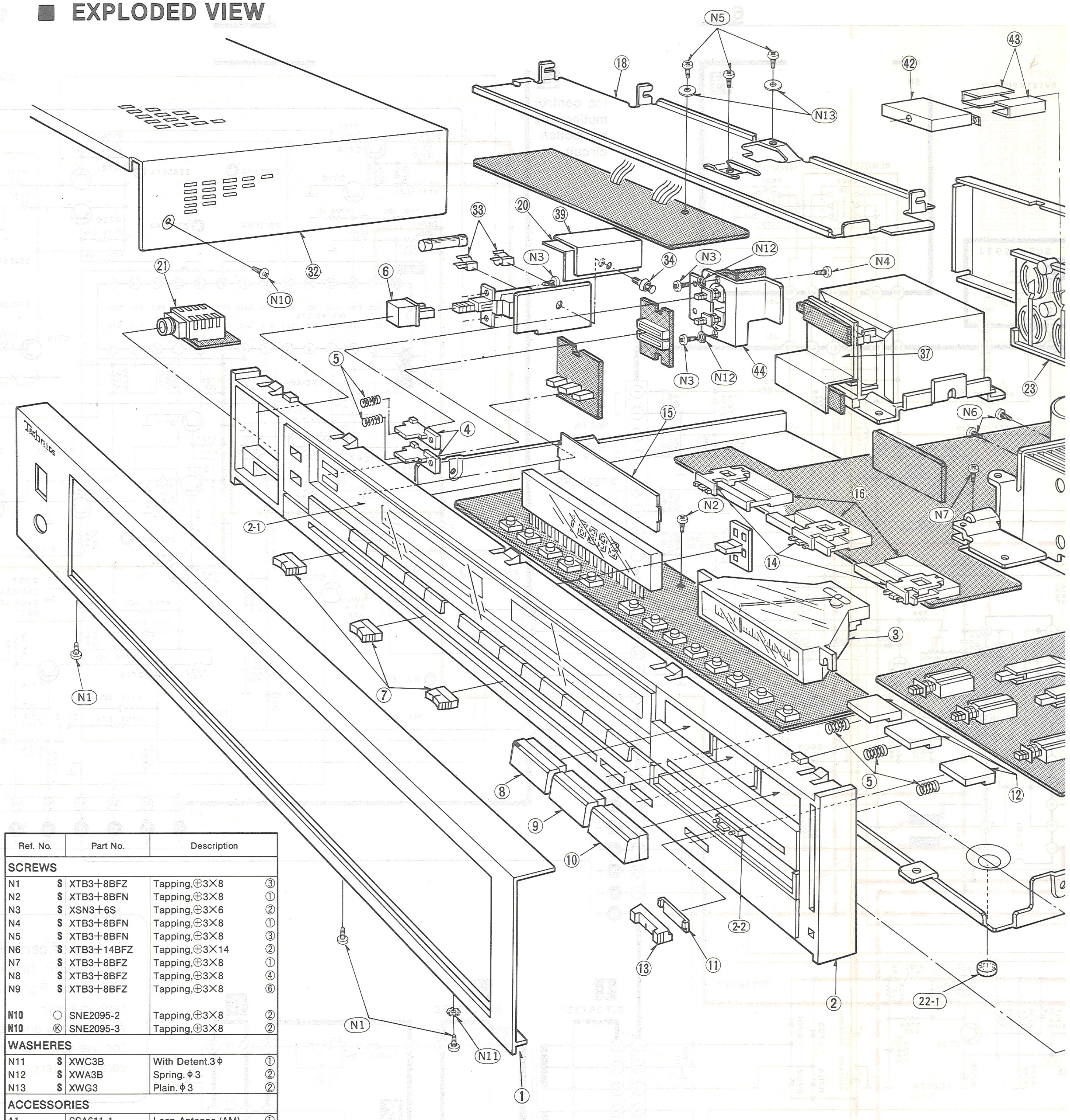
Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC1	AN6558F	Voltage Amplifier
IC71	AN7062	Voltage Amplifier
IC201	AN278	FM IF Amplifier
IC202	AN7273B	FM/AM IF Amplifier and FM/AM Det.
IC301	SVIUPC1161C3	Multiplex
IC601 ⚠	SVISTK2038-2	2ch Power Amplifier
IC701	MN1421STA	ICQ Controller
IC901	SVID1704C525	PLL Controller
IC902	SVIUPB553AC	Pre Scaler
IC903	AN6873N	FL Driver
TRANSISTORS		
Q71,72	2SA1123-R	Voltage Amplifier
Q210,211 S	2SC1685-Q	Switching
Q212,213 S	2SA722-S	FM/AM Selector
Q214～216 S	2SC1685-Q	Switching
Q217 S	2SA722-S	Switching
Q601,602	2SC2631-R	ICQ Controller
Q603	2SC1685-Q	Switching
Q701	2SD1265-0	Regulator
Q702	2SC1685-Q	Regulator
Q703 S	2SC1383Q	Regulator
Q704～712 S	2SC1685-Q	Preheat Det, Power on/off Det. Over Load Det. Signal Det. Power Muting
Q713,714	2SA992	Over Load Det.
Q715～721 S	2SA722-S	ICQ Control
Q901,902 S	2SC945-Q	Loop Filter
Q903,904 S	2SC1685-Q	Analog Frequency
DIODES		
D71,72 S	MA162A	Derector
D201	SVDKV1236Z	AM Variable Capacitor
D206	MA27W-A	Detector
D207 S	MA162A	Switching
D208	LN846RP	LED.Quartz-Lock Ind (Red)
D301 S	MA162A	Switching
D401	LN224RP	LED.Volume (Red)
D601,602	SVDMC921	Synchronous Bias
D603,604	SVDMC911	Synchronous Bias
D605～608 S	20A90	Switching
D609～611 S	MA162A	Switching
D612 ⚠	SVDSR1K2	Rectifier
D701～704 ⚠	SVDS2V20	Rectifier
D705	MA1062M	6V,Zener
D706	MA1270M	27V.Zener
D707	MA1160L	16V.Zener
D710～714 S	MA162A	Rectifier
D716	LN0202GP6	LED.Auto Ind.
D717	LN0202YP4	LED.Praheat Ind.
D718～720	LN446YP	LED.High,Low and Thermal Ind.
D751 S	MA162A	Swiching
D901～911 S	MA162A	Swithing
D913 S	MA162A	Swiching
D914 S	MA162A	Swiching
D915	MA162A	Swiching
D917 S	MA1062M	6V,Zener
D918 S	MA162A	Swiching
COILS		
L81～84	ELQS181KB	Choke
L202	SLA2C5-P	Antenna
L203	SL02C29R-P	OSC
L290,291	SLQZ12G1-D	Choke
L301	SLM1C69-P	Choke
L302	SLMA1Z3-Z	Choke

Ref. No.	Part No.	Description
COILS		
L601,602	SLQY15G-30	Choke
L651～654	SLQY15G-10	Choke
L701	SLQX101-3M	Choke
L750,751	SLQX400-D	Choke
FUSE		
F1 ⚠	XBA2C12TRO	250V,T1.2A
TRANSFORMERS		
T201	SLI4C535-Z	FM IF Off-Set
T202	SLI4C537-Z	Quartz Lock Ind.2kΩ(B)
T203	SLI2C143-M	AM IF
T701 ⚠	SLT5N407-W	Power Source
VARIABLE RESISTORS		
VR201	EVN58AA00B23	Quartz Look, 2kΩ(B)
VR301	EVN75AA00B53	VCO Adj 5kΩ(B)
VR401	EWE00605A15S	Volume Control, 100kΩ(A)
VR501	EVD00305G15S	Balance Control, 100kΩ(G)
VR502,503	EWD00205C15S	Tone Control, 100kΩ(C)
VR601,602 S	EVNM4AA00B53	ICQ Adj 5kΩ(B)
VR701 S	EVNM4AA00B14	Micom Vco Adj,10kΩ(B)
VR901	EVN75AA00B53	Meter Adj, 5kΩ(B)
VARIABLE CAPACITOR		
CT201	SVCTY121B269	AM Antenna Trimmer
COMPONENT COMBINATIONS		
Z301,302	EXRP102K473T	180PF,47kΩ
Z901	EXBP87104M	100kΩ(×7)
Z902	EXFP7331MW	330PF(×7)
FLUORESCENT DISPLAY TUBE		
	SAD7MT29ZA	
FM FRONT END		
	SNVFE407G4S	Front End
THERMISTORS		
PS701	SRPBH47101	Posistor
PS702	SRPBD47101	Posistor
TH920	ERTD2FHL103S	10kΩ
CERAMIC FILTERS		
CF201	SVFE107MZ2-A	FM,10.7MHz (Red)
	SVFE107MZ2-D	FM,10.65MHz (Black)
CF202,203	SVFE107MM-A	FM,10.7MHz. (Red)
	SVFE107MM-D	FM,10.65MHz, (Black)
	(Use pair ranks as same as CF201 CF202 and CF203)	
CF204	SVFSFZ450F7L	AM,450kHz
SWITCHES		
S3～S15	SSG13	AM/FM Selector, Tuning Memory
S401～403	SSH3049	Input Selector
S17,405,407	SSH1031	FM Mode,Tape Monitor and Loudness
S701 ⚠	SSH1071	Power Source
S601,602	SSH2047	Speakers
CRYSTAL		
X901	SVQ43U452-D	4.5MHz

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
1 ○	SGWA310M	Front Panel Ass'y ①
1 Ⓚ	SGWA310KE	Front Panel Ass'y ①
2 ○	SGXA310M	Sub Front Panel Ass'y ①
2 Ⓚ	SGXA310KE	Sub Front Panel Ass'y ①
2-1 ○	SGU319SJ	Transparent Plate ①
2-1 Ⓚ	SGU319BB	Transparent Plate ①
2-2	SGX7431-1	Holder ①
3	SSM175-4	Meter ①
4 ○	SBC483-2	Button,Speaker ②
4 Ⓚ	SBC483-4	Button,Speaker ②
5	SUS 257	Spring ⑤
6	SBC337-1M	Button,Power ①
7 ○	SBD69-2M	Button,Bass,Treble Balance ③
7 Ⓚ	SBD69-1M	Button,Bass,Treble Balance ③
8	SBC549-7	Button,Selector (Aux,CD.Video) ①
9	SBC547-4	Button,Selector (Tuner) ①
10	SBC551-4	Button,Selector (Phono) ①
11	SHR9653	Spacer,Main Volume ①
12	SBC565-1M	Button,FM mode,Tape monitor Loudness ③
13 ○	SBD71	Button,Main Volume ①
13 Ⓚ	SBD71-1	Button,Main Volume ①
14	SBZ663-1	Connection Rod. ③
15	SDU89-1	Sheet,FL ①
16 ○	SGX7475	Holder ③
16 Ⓚ	SGX7475-1	Holder ③
17	SUB139-1	Connection Rod ③
18	SMC1041-1	Shield Cover ①
19	SJS9105	Socket,FM (1)
20	SMX763	Cover,Fuse P.C.B ①
21	SJJ71B	Jack,Headphones ①
22	SKUA310G	Bottom Board (W/Feet) ①
22-1	SKL245-2	Foot ④
23	SJF4815-2	Terminal Board,Speaker ①
24	SJF8037-14N	Terminal Board,In Put ①
25	SJA138-3	AC Cord ①
26	SHR127	Bushing ①
27	SJFA3101-1	Terminal Board AM (1)
28	SJB3005-1	Battery Case ①
29	SJC7	Terminal,Battery ②
30	SJC9	Terminal,Battery ②
31	SGP3510-12A	Rear Panel ①
32 ○	SKCA410M	Cabinet Ass'y ①
32 Ⓚ	SKCA310KE	Cabinet Ass'y ①
33	SJT347	Crip,Fuse ②
34	SHR411	Pin ①
35	SHR301	Cramper,Read Wire ②
36	SHE101	Holder,P.C.B ①
37	SMX769	Insulation Sheet, ①
38	SHR401-1	Pin ③
39	SMX765	Insulation Sheet ①
40	RJP5	Connector (1)
41	SUW1429	Bracket (1)
42	SMC1015	Shield Cover (1)
43	SMX681	Shield Cover (2)
44	SMN1857	Bracket,Speaker (1)

Ref. No.	Part No.	Description
SCREWS		
N1 S	XTB3+8BFZ	Tapping,⊕3×8 ③
N2 S	XTB3+8BFN	Tapping,⊕3×8 ①
N3 S	XSN3+6S	Tapping,⊕3×6 ②
N4 S	XTB3+8BFN	Tapping,⊕3×8 ①
N5 S	XTB3+8BFN	Tapping,⊕3×8 ③
N6 S	XTB3+14BFZ	Tapping,⊕3×14 ②
N7 S	XTB3+8BFZ	Tapping,⊕3×8 ①
N8 S	XTB3+8BFZ	Tapping,⊕3×8 ④
N9 S	XTB3+8BFZ	Tapping,⊕3×8 ⑥
N10 ○	SNE2095-2	Tapping,⊕3×8 ②
N10 Ⓚ	SNE2095-3	Tapping,⊕3×8 ②
WASHERES		
N11 S	XWC3B	With Detent.3φ ①
N12 S	XWA3B	Spring. φ3 ②
N13 S	XWG3	Plain. φ3 ②
ACCESSORIES		
A1	SSA611-1	Loop Antenna (AM) ①
A2	SMA231	Holder ①
A3	SMA233-1	Holder ①
A4	XTN3+10AFZ	Screw ②
A8	SQF11787	Instruction Book ①

EXPLODED VIEW



EXPLODED VIEW

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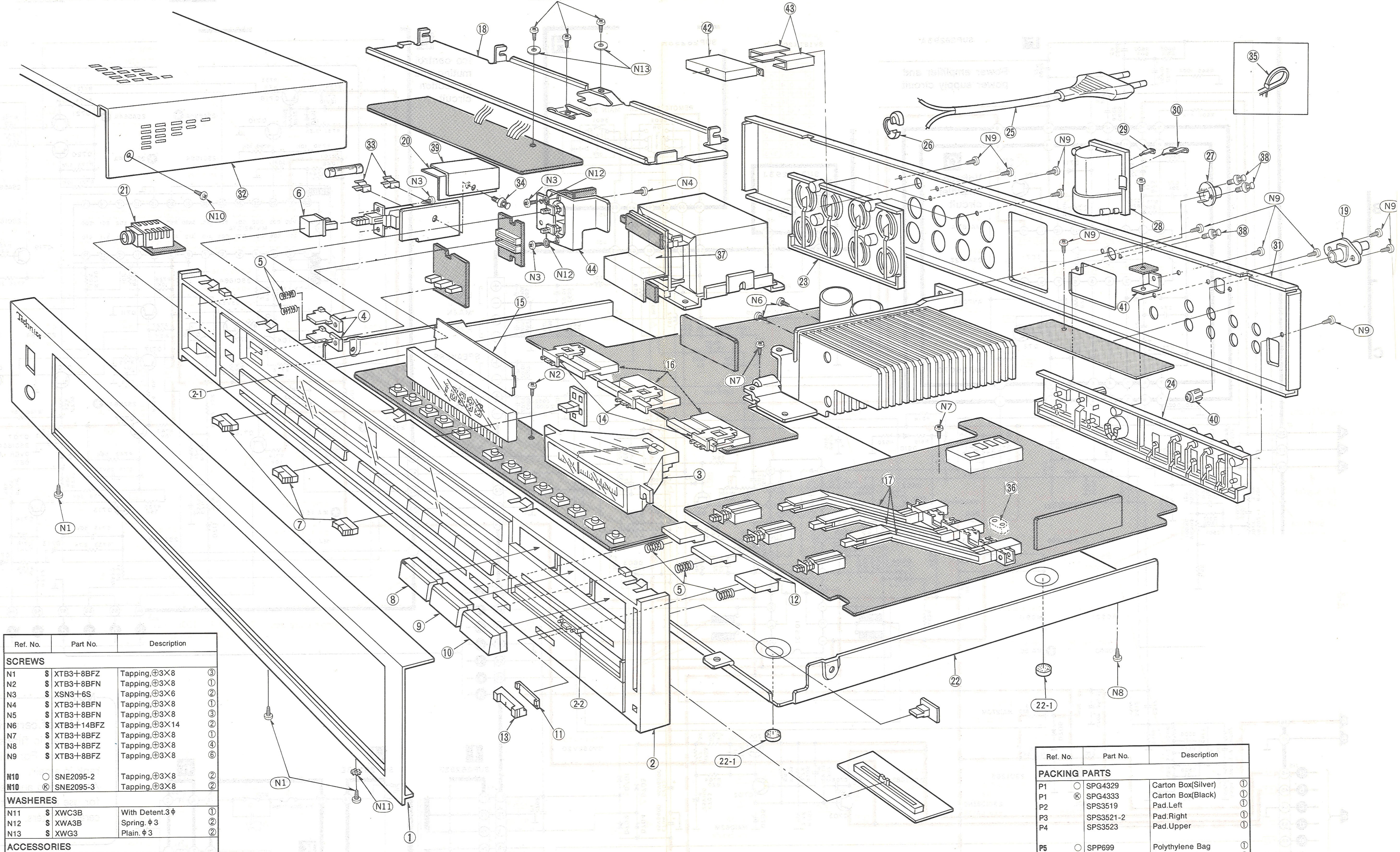
Description	
RTS	
Front Panel Ass'y	①
Front Panel Ass'y	①
Sub Front Panel Ass'y	①
Sub Front Panel Ass'y	①
Transparent Plate	①
Transparent Plate	①
Holder	①
Meter	①
Button,Speaker	②
Button,Speaker	②
Spring	⑤
Button,Power	①
Button,Bass,Treble Balance	③
Button,Bass,Treble Balance	③
Button,Selector (Aux,CD.Video)	①
Button,Selector (Tuner)	①
Button,Selector (Phono)	①
Spacer,Main Volume	①
Button,FM mode,Tape monitor Loudness	③
Button,Main Volume	①
Button,Main Volume	①
Connection Rod.	③
Sheet,FL	①
Holder	③
Holder	③
Connection Rod	③
Shield Cover	①
Socket,FM	(1)
Cover,Fuse P.C.B	①
Jack,Headphones	①
Bottom Board (W/Feet)	①
Foot	④
Terminal Board,Speaker	①
Terminal Board,In Put	①
AC Cord	①
Bushing	①
Terminal Board AM	(1)
Battery Case	①
Terminal,Battery	②
Terminal,Battery	②
Rear Panel	①
Cabinet Ass'y	①
Cabinet Ass'y	①
Crip,Fuse	②
Pin	①
Cramper,Read Wire	②
Holder,P.C.B	①
Insulation Sheet,	①
Pin	③
Insulation Sheet	①
Connector	(1)
Bracket	(1)
Shield Cover	(1)
Shield Cover	(2)
Bracket,Speaker	(1)



Ref. No.		Part No.	Description	
SCREWS				
N1	S	XTB3+8BFZ	Tapping,⊕3X8	③
N2	S	XTB3+8BFN	Tapping,⊕3X8	①
N3	S	XSN3+6S	Tapping,⊕3X6	②
N4	S	XTB3+8BFN	Tapping,⊕3X8	①
N5	S	XTB3+8BFN	Tapping,⊕3X8	③
N6	S	XTB3+14BFZ	Tapping,⊕3X14	②
N7	S	XTB3+8BFZ	Tapping,⊕3X8	①
N8	S	XTB3+8BFZ	Tapping,⊕3X8	④
N9	S	XTB3+8BFZ	Tapping,⊕3X8	⑥
N10	○	SNE2095-2	Tapping,⊕3X8	②
N10	Ⓚ	SNE2095-3	Tapping,⊕3X8	②
WASHERES				
N11	S	XWC3B	With Detent.3ϕ	①
N12	S	XWA3B	Spring. ϕ3	②
N13	S	XWG3	Plain. ϕ3	②
ACCESSORIES				
A1		SSA611-1	Loop Antenna (AM)	①
A2		SMA231	Holder	①
A3		SMA233-1	Holder	①
A4		XTN3+10AFZ	Screw	②
A8		SQF11787	Instruction Book	①

Ref. No.		Part No.	Description	
PACKING PARTS				
P1	○	SPG4329	Carton Box(Silver)	①
P1	Ⓚ	SPG4333	Carton Box(Black)	①
P2		SPS3519	Pad.Left	①
P3		SPS3521-2	Pad.Right	①
P4		SPS3523	Pad.Upper	①
P5	○	SPP699	Polythylene Bag	①
P5	Ⓚ	SPP649	Polythylene Bag	①

Printed in Japan
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ORDER NO. HAD8709293S2

Service Manual

Supplement

Receiver

QUARTZ Synthesizer
MW/LW/FM Stereo Receiver

SA-R310L

Color

(K) ....Black Type	

Area

Color	Area
(K)	(EW) ....Switzerland.
(K)	(EF) ....France.
(K)	(EB) ....Belgium.
(K)	(EK) ....United Kingdom.

Please file and use this supplement manual together with the service manual for Model No. SA-R310L, Order No. HAD8706181A2.

Note:

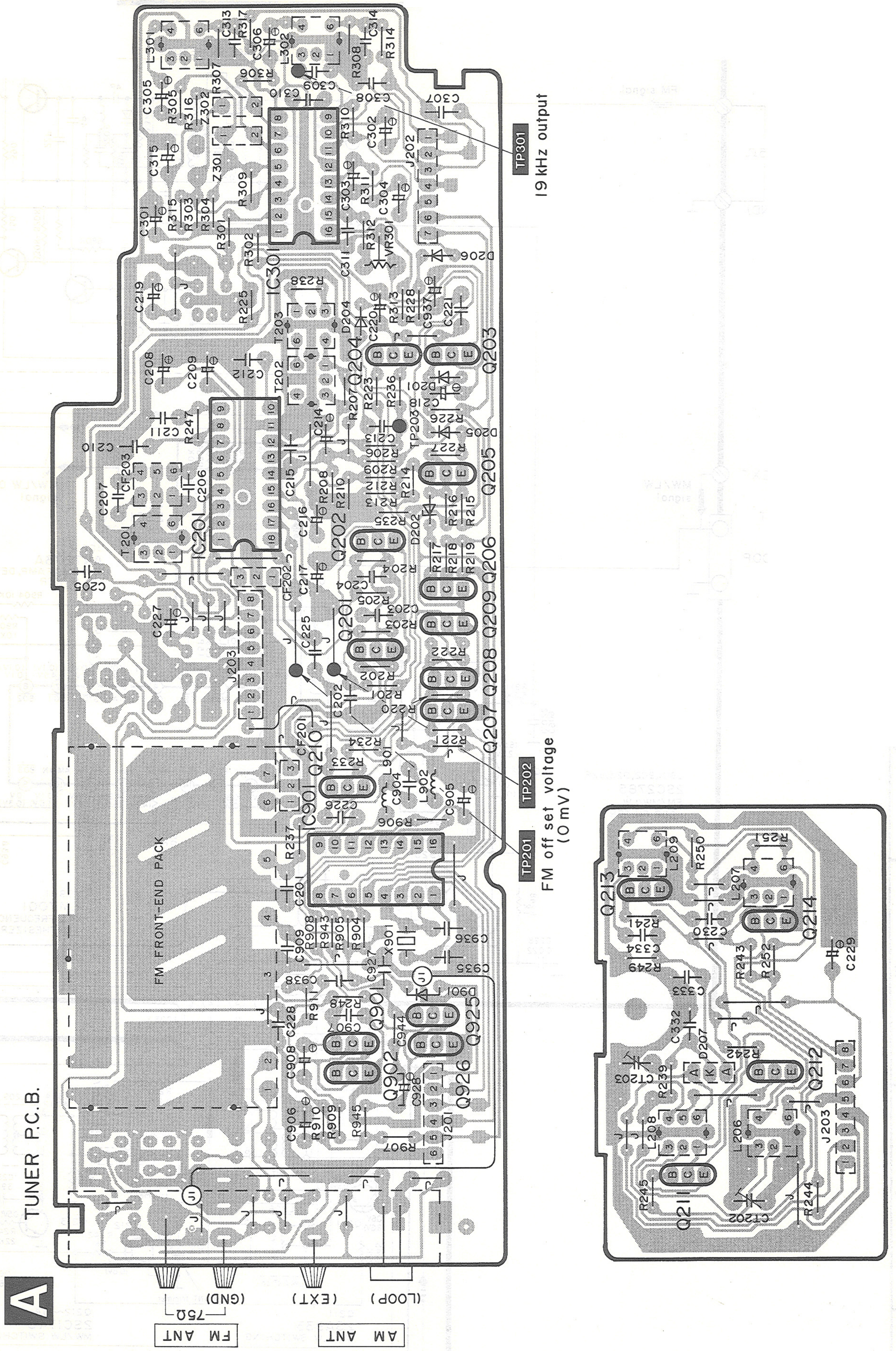
This supplement has been issued to inform you that the tuner P.C.B. has been changed during production.

Technics

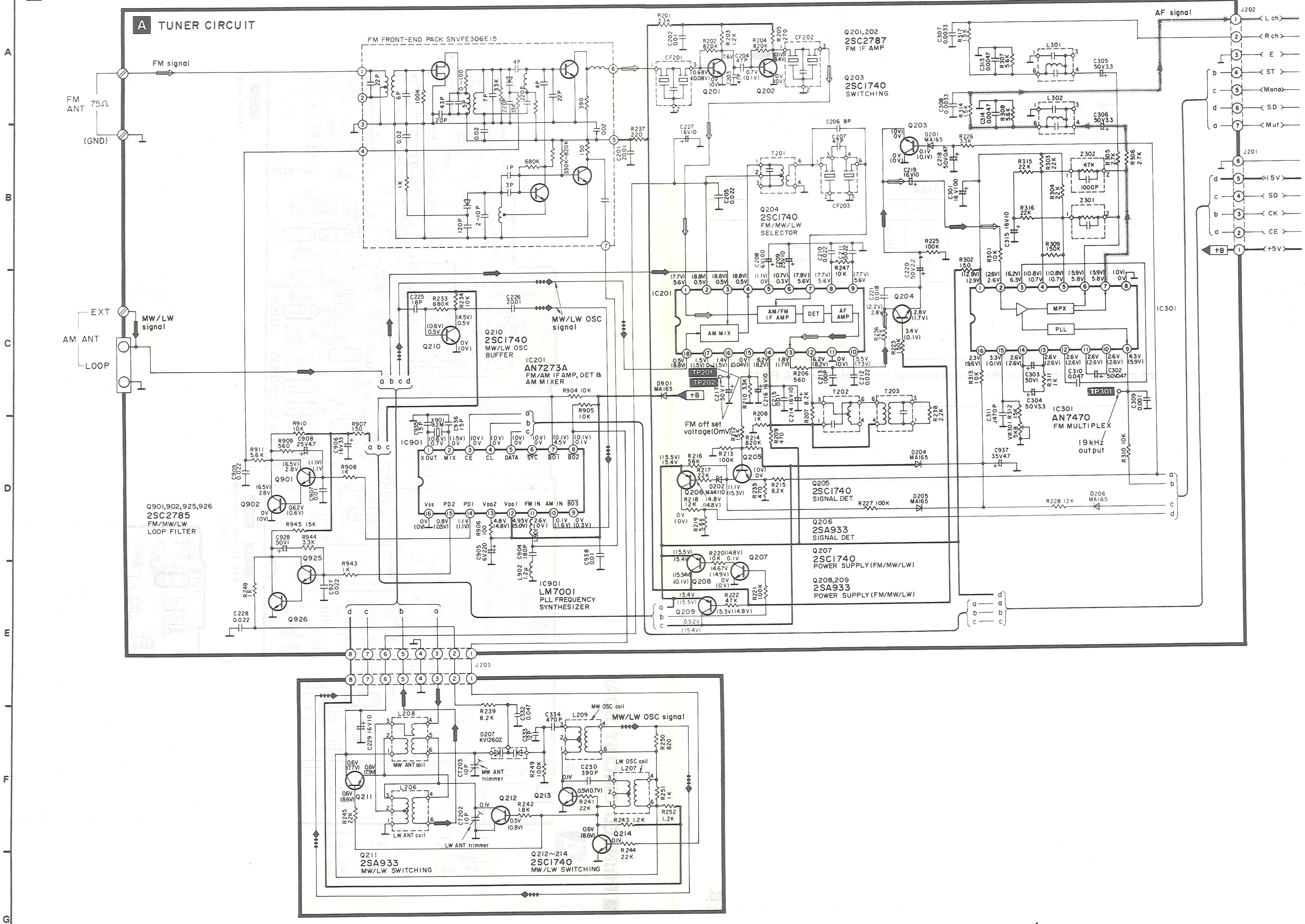
Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

A PRINTED CIRCUIT BOARD

TUNER P.C.B.


TP301
19 kHz output
TP202
FM off set voltage
(0 mV)
TP201
FM FRONT-END PACK
IC301
IC201
IC901
FM ANT
75Ω
(GND)
AM ANT
(EXT)
(LOOP)

SCHEMATIC DIAGRAM


A TUNER CIRCUIT
FM FRONT-END PACK SNVFE306E15
FM signal
FM ANT 75Ω
(GND)
EXT
AM ANT
LOOP
MW/LW signal
MW/LW OSC signal
AF signal
Q201,202 2SC2787 FM IF AMP
Q203 2SC1740 SWITCHING
Q204 2SC1740 FM/MW/LW SELECTOR
Q205 2SC1740 SIGNAL DET.
Q206 2SA933 SIGNAL DET
Q207 2SC1740 POWER SUPPLY (FM/MW/LW)
Q208,209 2SA933 POWER SUPPLY (FM/MW/LW)
Q210 2SC1740 MW/LW OSC BUFFER
IC201 AN7273A FM/AM IF AMP, DET & AM MIXER
AM/FM IF AMP
DET
AF AMP
AM MIX
IC301 AN7470 FM MULTIPLEX
MPX
PLL
19kHz output
TP201
TP202
TP301
FM off set voltage (0mV)
IC901 LM7001 PLL FREQUENCY SYNTHESIZER
XOUT MIX CE CL DATA SYC BO1 BO2
Vss PD2 PD1 VDD2 VDD1 FM IN AM IN BO3
Q901,902,925,926 2SC2785 FM/MW/LW LOOP FILTER
D901 MA165
+B
J201
J202
J203
L ch
R ch
E
ST
Mono
SD
Mut
+15V
SO
CK
CE
+5V
L208 MW ANT coil
L206 LW ANT coil
L209 MW OSC coil
L207 LW OSC coil
CT203 MW ANT trimmer
CT202 LW ANT trimmer
D207 KV1260Z
Q211 2SA933 MW/LW SWITCHING
Q212~214 2SC1740 MW/LW SWITCHING
1 2 3 4 5 6 7 8 9 10
A B C D E F G

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